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ART. XXXI.—CHEMICAL EXAMINATION OF THE ROOT OF FRASERA WALTERI. By John Wyeth Douglass.

(*Extract from an Inaugural Essay.*)

There has been no regular analysis of this plant. Dr. Drake of Cincinnati made a few experiments on the root; they seem, however, to have been instituted more for the purpose of ascertaining the means of discrimination between the Frasera and the tonic of Mozambique, than to determine its chemical constitution. Thus he says, "this root (F. Walteri,) gives out its bitterness more fully to alcoholic than aqueous menstrua; the reverse of which is the case with columbo; its spirituous tincture suffers decomposition upon the addition of water, indicating that it contains resin, which the Columbo does not, at least in any considerable quantity," &c. The following experiments were made with the dried root.

To the filtered decoction alcohol was added, which produced a flocculent precipitate indicating the presence of gum or mucilage. The solution of acetate of lead also precipitated a large quantity of gum.

The non-existence of starch was ascertained by adding tincture of iodine to the cold decoction, which was not affected by this delicate test.

Upon the addition of oxalate of ammonia to the clear in-

fusion, a slight precipitate was observed, showing lime to be present.

A portion of the bruised root was submitted to the action of water slightly acidulated with hydrochloric acid; to this infusion, which was of a light wine color, oxalate of ammonia was added; a greater precipitate than in the simple infusion was observed, from which circumstance it may be supposed the larger portion of lime was in combination with an acid, most probably the carbonic, which compound is insoluble in water; the decomposition of this salt would take place on the addition of the acidulated liquid, affording a solution of the soluble hydrochlorate of lime, which in turn would be decomposed by oxalate of ammonia; producing a dense white precipitate of the very insoluble oxalate of lime.

The ashes obtained by incinerating a portion of the root were treated with very dilute hydrochloric acid, which produced effervescence. When filtered to separate a small quantity of charcoal, oxalate of ammonia or soda produced a dense white precipitate, thus confirming the preceding experiments in testing for lime.

The presence of iron was not indicated by the addition of ferrocyanate or sulphocyanate of potassa to the decoction.

On the supposition that iron might be present in the state of protoxide, a portion of the root was boiled in water acidulated with nitric acid. This action would have converted it into sesquioxide: but no blue compound was formed by the addition of ferrocyanate of potassa.

When a salt of the sesquioxide of iron was added to the decoction or infusion, it assumed a greenish-black color; showing tannin to be present; and that variety which exists in Peruvian bark, kino, &c. &c.

Solution of gelatin produced no change whatever in the infusion or decoction, from which we may judge the tannin to exist in small quantity.

Nitrate of silver caused a white precipitate.

Solution of potassa deepened the red color of the decoc-

tion. The same phenomenon took place on the addition of water of ammonia.

Sulphuric acid nearly destroys its color.

The infusion was not affected by the following metallic salts: bichloride of mecury, sulphate of copper, sulphate of zinc, and tartrate of antimony and potassa.

The decoction was made by boiling an ounce of the bruised root in a pint and a half of water to one pint; it was of a light wine color, and did not affect litmus or turmeric paper. The infusion was prepared by adding a pint of boiling water to an ounce of the bruised root. The tincture was of a dark wine color, and prepared by macerating one ounce of the bruised root in a pint of diluted alcohol for fourteen days. By macerating an ounce of the bruised root in half a pint of alcohol, specific gravity, .84, a tincture was obtained of a light straw color, and possessed of the sensible properties of the root. Upon the addition of water to this, a precipitation took place, showing resin to be a constituent.

A peculiar proximate principle has been discovered in the root of *Gentiana lutea* by MM. Henry and Caventou. was induced to try a process similar to theirs with this root, as these plants belong to the same natural family of Gentianeæ, and possess analogous properties in a medicinal point of view.

One ounce of the coarsely powdered root was subjected to the action of sulphuric ether s. g. .73, in a displacement apparatus, by which process a saturated tincture was obtained of a rich straw color; neither litmus nor turmeric paper were affected by it. This was evaporated in a water bath to the consistence of a syrup; after a few hours rest it assumed the appearance of an extract of a bright yellow color, and crystalline in its structure, possessing a fatty, nauseous taste, with but little bitterness. It was then treated with two ounces of alcohol s. g. .84, which dissolved it, with the exception of a small portion of viscid fatty matter, insoluble in cold alcohol and water, soluble in ether and boiling alcohol, which precipitates it upon cooling; it leaves a permanent stain upon paper.

The alcoholic tincture was also of a bright yellow color.

When gently evaporated in a water bath, a yellow crystalline mass appeared, resembling moist sugar. It was acted on by diluted alcohol; a small portion of matter was not taken up, resembling that which was not dissolved in the preceding case; again evaporated, minute crystals of a bright yellow color appeared, possessing no odor, and little if any taste. They dissolve readily in alcohol and ether, and in alkaline solutions, which render them of a deeper yellow color. Hydrochloric acid dissolves them, and at the same time deprives them of color. On the addition of nitric acid a deep blood-red solution is formed; by heating it, nitrous acid gas is driven off, and its red color disappears. Sulphuric acid also turns them to a red color, though not so brilliant as by nitric acid. They are nearly insoluble in cold water, which, however, acquires a milky appearance. Boiling water dissolves a small quantity which is precipitated on cooling.

My attempt to sublime a portion in a glass tube did not succeed; on the application of a gentle heat it melts, and upon reducing the temperature becomes a solid mass of a yellowish-white color, resembling yellow beeswax; it is decomposed by a greater heat, takes fire on the approach of flame and burns with a reddish light, attended with much smoke; a light ash is left which may be dissipated by exposure to heat and air. Its alcoholic solution slightly reddened litmus paper; with a solution of carbonate of potassa there was a slight effervescence; and tincture of muriate of iron caused a deep greenish-black precipitate. From these last experiments I am inclined to believe that this substance consists of gallic acid combined with a yellow coloring principle; from the small quantity obtained, my experiments were necessarily limited, and the properties of gallic acid are very concisely treated of, in the authorities to which I had access.

The extract prepared by boiling an ounce of the root in a pint of water, and evaporating to the solid consistence in a water bath, was of a dark brown color, its taste was at first sweetish, followed by a pleasant bitterness. By this mode two drachms of extract of a consistence to form pills, were ob-

tained from one ounce of the root. That prepared with diluted alcohol in the same proportions, was of a redder color, but not superior in bitterness to the watery extract; nearly three drachms of extract were procured by this process.

My attempts to procure volatile oil by distillation did not succeed. The water, that came over, possessed but little bitterness.

This root is mentioned as an adulteration of the true Columbo (*Cocculus palmatus*,) but may be distinguished from that drug by the want of concentric and radiating lines which mark the latter, and its pure yellow color without a tinge of green. It will be seen from the foregoing experiments, that iodine affords an excellent means of discrimination between these articles. If a fresh cut surface of each of these roots be immersed for a few moments in boiling water, and then touched with iodine or its tincture, a blue compound will be formed with the Columbo, indicating the presence of starch, while the Frasera will not be affected in the least by this reagent. The difference in their specific gravity, may also serve to distinguish them; when thrown into water the Columbo immediately sinks to the bottom of the vessel; the Frasera, from its greater levity, swims on the surface.

From the preceding experiments the root of American Columbo may be supposed to contain Gum or Mucilage, Lime, Carbonate of Lime, Tannin, Gallic Acid, Resin, Fatty Matter, Sugar, a yellow coloring substance, Bitter Extractive, Lignin.

ART. XXXII.—PHARMACEUTICAL NOTICES. NO. XVIII.

By AUGUSTINE DUHAMEL.

Bi-Carbonate of Soda.

As the article of Bi-Carbonate of Soda is very extensively used in this country, and is prepared on a large and economical scale by our manufacturers, it is of the highest importance that our apothecaries should be made acquainted with the method by which it is made. In a communication published in this Journal (vol. 1st, second series) by F. R. Smith, some attention was directed to this subject, by a mention of the fact, that while the different Colleges directed a formula for Bi-Carbonate of Soda, (but resulting in a sesqui-carbonate, as was proved by Phillips, the English chemist,) our manufacturers were engaged in making the article by a novel process which furnished a bi-carbonate with which our shops were then, and are still, supplied. Mr. S. mentioned that it was made by directing a current of carbonic acid gas through dry carbonate of soda, but gave no particulars in relation to the construction of the apparatus. The U. S. Pharmacopœia, under the head of Bi-Carbonate of Soda, directs it to be prepared by transmitting carbonic acid gas through carbonate of soda in solution. The London Pharmacopœia, last edition, gives the same process under the title of Sesqui-Carbonate of Soda. We have, therefore, a formula, authorising, as officinal, a substance not generally, if at all, found in the shops.

The following details, prepared from the formula given in the French Codex, which is that of the manufacturers, and pursued in all the large laboratories of this country, from whence our supplies are derived, convey, assisted by the drawing, all the information necessary to an apothecary to enable him to prepare his own Bi-Carbonate of Soda.

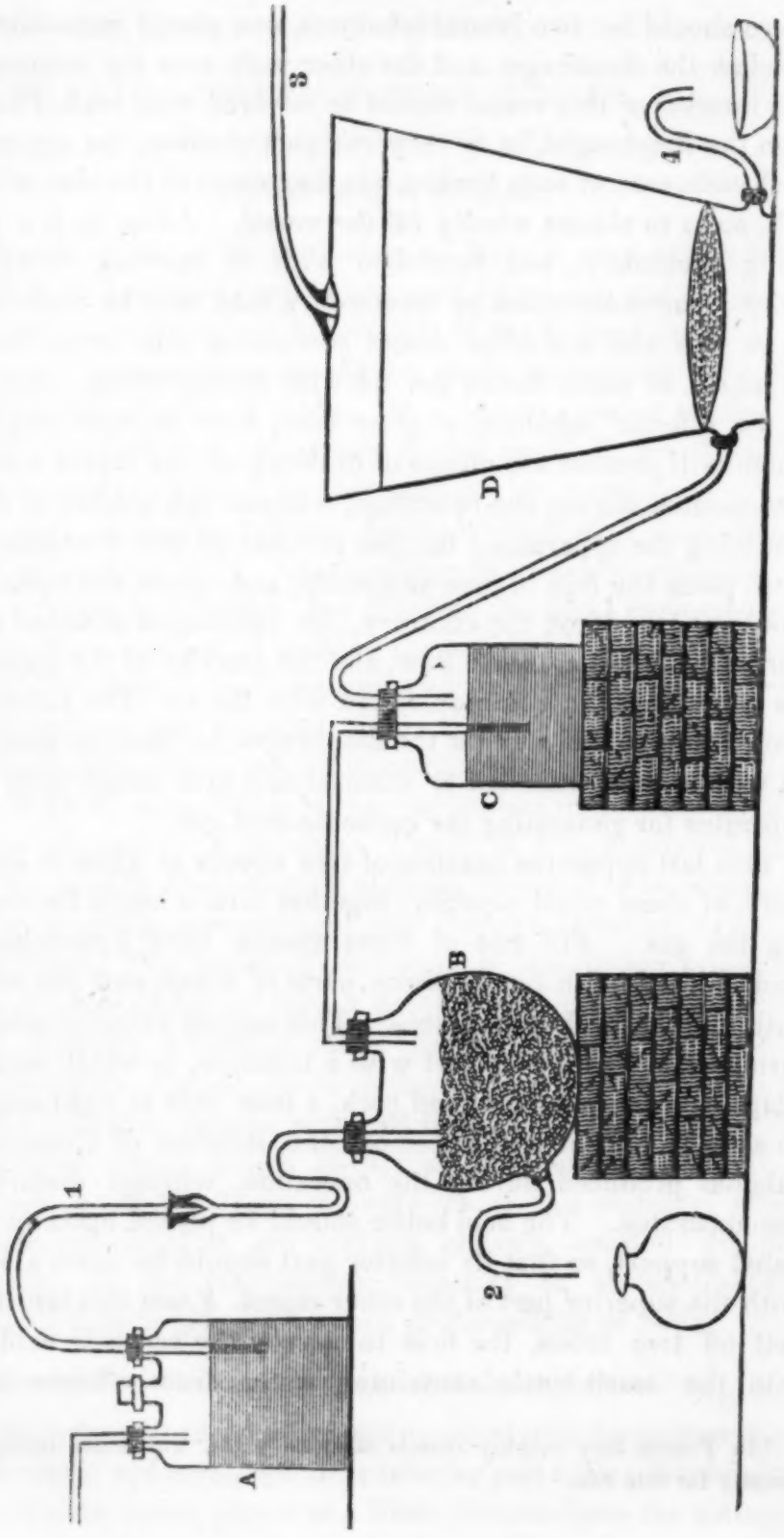
Take of Carbonate of Soda in crystals, any quantity.

Provide a deep wooden box, slightly conical with the narrow part downwards, and furnished at its inferior part with a diaphragm pierced with holes, placed at a little distance from the bottom.

There should be two lateral tubulures, one placed immediately below the diaphragm, and the other very near the bottom.* The interior of this vessel should be covered with lead. Place upon the diaphragm, in a very compact manner, the crystallized carbonate of soda broken into fragments of the size of an inch, so as to almost wholly fill the vessel. Adapt to it a lid fitting accurately, and furnished with an opening through which a communication by means of a tube may be made between this and a similar vessel containing also crystallized carbonate of soda: fasten the lid with strong luting. Adapt to the inferior tubulure, a glass tube, bent at right angles, which will present the means of drawing off the liquid which accumulates during the operation, without the trouble of dismounting the apparatus; for this purpose all that is necessary is to place the free branch vertically, and direct the opening downwards. If, on the contrary, the opening is directed upwards, the liquid ceases to flow, and the interior of the apparatus is no longer in communication with the air. The tubulure placed immediately under the diaphragm, is likewise provided with a tube intended to connect this first vessel with the apparatus for generating the carbonic acid gas.

This last apparatus consists of two vessels of glass or stone ware, of about equal capacity, together with a bottle for washing the gas. Fill one of these vessels with hydrochloric acid, diluted with two or three parts of water, and the other with marble, broken in pieces. This second vessel should be furnished at its inferior part with a tubulure, to which may be adapted, by means of a good cork, a tube bent at right angles, so as to be able at will to remove the solution of chloride of calcium produced during the operation, without disturbing the apparatus. The acid bottle should be placed upon an elevated support, so that its inferior part should be upon a level with the superior part of the other vessel. From this last there sett off two tubes, the first to convey the carbonic acid gas into the wash-bottle containing water, from whence it is

*In France they employ vessels of stone ware, which are made expressly for this use.


3
4
D
C
B
1
2
A

transmitted to the vessel containing the carbonate of soda by means of a tube fixed to the opening near the diaphragm: the second tube destined to bring the hydrochloric acid upon the marble, should be bent S form, and widened at its superior part: place it vertically in the customary manner. Plunge into the S tube a syphon, starting from the acid reservoir, and let its longest branch (that which is plunged into the S tube) be terminated by a capillary opening, so that when the syphon is exhausted of air, the acid will pass drop by drop.

When the apparatus begins to work properly, it may be left to itself for a length of time proportioned to the capacity of the vessel serving as the reservoir. The solution of chloride of calcium is to be removed every day, by means of the tube attached to the inferior part of the vessel containing the broken marble: operate in the same manner for the liquid which runs from the crystals, according to their degree of saturation. Be careful to renew the acid and marble when necessary.

The carbonate of soda of the first vessel is perceived to be saturated, when the water begins to run from beneath the crystals contained in the second vessel. At this point suspend the operation by removing the syphon which conducts the acid. The luting being now taken away, and the lid removed, the Bi-Carbonate of Soda is exhibited in the form of skeletons of the original crystals of soda, loosely arranged and possessing a snow white crystalline appearance.

Nothing farther remains but to place it upon frames, covered with paper, and to dry in a stove.

Reference to the Apparatus.

A, diluted acid,
B, marble.
C, water to wash the gas.
D, carbonate of soda.
1, syphon.
2, tube for removing muriate of lime.
3, tube connecting with second box.
4, tube to draw off the water.

Cyanuret of Silver.

This article, which is used for the extemporaneous production of hydrocyanic acid, is officinal in the New London Pharmacopœia, and is likely to be included among the number of new preparations proposed to be introduced into the forthcoming edition of the U. S. Pharmacopœia. There are three methods of obtaining this substance. The first is that of the London, which is to decompose nitrate of silver in solution by dilute hydrocyanic acid. The second is the most eligible method for manufacturers, and consists in directing, through a solution of nitrate of silver, a current of hydrocyanic acid gas, until it ceases to throw down a precipitate. The gas is obtained by treating prussiate of potash with sulphuric acid in a glass retort; which should be connected by a glass tube with the vessel containing the solution of silver. The third method, which I am about to detail, offers a ready means of obtaining this substance, wherever perfectly dry, undecomposed cyanuret of potassium can be procured.

It is as follows:

Take of Cyanuret of Potassium, 5 drachms or 15 parts; Crystallized Nitrate of Silver 11 drachms, one scruple, 34 parts; distilled water 16 ounces or 384 parts,—by measure.

Dissolve the two salts separately, in the distilled water; mix the solutions together, stir with a glass rod, then throw upon a filter, and wash the precipitate with distilled water; lastly dry the cyanuret in the dark, by the gentle heat of a stove.

Composition.

1 eq. Cyanogen	26.436	or 19.4.
1 " Silver	108.305	" 80.6.
	134.000	100.0.

Iodide of Arsenic.

This combination is prepared according to Plisson, by digesting three parts of arsenic in fine powder, with ten parts

of Iodine, and 109 parts of water until the odor of Iodine is no longer manifested.

The clear liquid is then decanted and submitted to evaporation: at a certain degree of concentration, the Iodide is produced in the form of red crystals, or the solution may be evaporated to dryness, and then sublimed in close vessels without decomposition. It may be made to combine with a new portion of Iodine. Water in large quantity dissolves it without any residue, but when digested with a small quantity it decomposes, forming hydriodic acid in solution and white crystalline scales, composed of water, acid, and iodide in variable proportions. Latterly it has been employed in Europe as a medicine. It is a powerful poison. An extemporaneous preparation combining the virtues of both of these active substances, has been used successfully in this city. It is formed of—

Lugol's Solution of Iodine, ℥i.
Fowler's " " Arsenic, ℥iv.

When mixed together in these proportions a change is observed in the appearance of the mixture, which is, in an instant, rendered almost colorless. The dose is five drops.

Syrup of Morphia.

Sulphate of Morphia gr. viij.
Syrup " 8oz.

Dissolve the Morphia in the Syrup, with a few drops of diluted sulphuric acid.

This is not an officinal preparation, and consequently possesses a very indefinite character as found in the shops. As physicians occasionally prescribe it, it should be of determinate strength. The same discrepancy occurs in relation to the strength of the solution of morphia, although, officinal in the American Pharmacopœia. In some parts of the country it is made in the proportion of 1 gr. to the ounce, as in this city, while in other places it is always made and understood to contain 8 grs. to the ounce.

The proper strength of the syrup should be 1 gr. to the

ounce. It is intended by some physicians as a substitute for the weaker solution of morphia, in being more palatable : besides the solution very soon decomposes, and becomes covered with a mucilaginous film, which can only be avoided by adding a few drops of alcohol; this however, is objected to, on account of the taste.

ART. XXXIII.—ON THE TARTRATE OF IRON AND POTASSA.

By William Procter, Jr.

This preparation has been much neglected, doubtless on account of the difficulty of obtaining it of a good quality. Many processes and formulæ have been published for its manufacture, but hitherto, none without objections. According to the Edinburgh and Dublin Pharmacopœias, metallic iron is mixed with bi-tartrate of potassa and water, and the mixture exposed to the air for several weeks, during which the iron becomes peroxidized, and united with the excess of acid in the bi-tartrate. By solution and evaporation a double tartrate of iron and potassa results. If no other objection could be urged against this process, the length of time required renders it ineligible.

Our Pharmacopœia of 1830, directs precipitated carbonate of iron to be boiled with bi-tartrate of potassa, and the solution which contains the double tartrate is evaporated to dryness. In this process the objection is that the sesquioxide of iron is not presented in a state favorable to ready combination, and but a small product is obtained.

The late London Pharmacopœia, (1836,) contains a process of which the following is a sketch. Sesquioxide of iron, (the precipitated carbonate of our Pharmacopœia,) is dissolved in hydrochloric acid ; the solution thus formed mixed with a large quantity of water. The sesquioxide of iron is then

precipitated from the solution in the state of a *hydrate*, by the addition of solution of potassa, and washed with pure water until deprived of adhering saline matter. This hydrate of the sesquioxide of iron is then boiled with bi-tartrate of potassa until it is dissolved; the solution, filtered and evaporated to dryness. If, after the solution of the hydrated oxide, the liquor is acid, solution of sesqui-carbonate of ammonia is directed to be added until it is neutral.

The salt thus obtained has a dark olive green color, is very deliquescent, and when an attempt is made to dissolve it, an insoluble residue remains, which is most probably the proto-tartrate of iron.

In repeating this process it has been found that more than a twenty-third of the bi-tartrate remains undissolved. Though at first deliquescent, this salt after standing three months became of a mottled, light green color, and was much less soluble than when first made, and had an ammoniacal odor. This is accounted for, by supposing the decomposition of the tartrate of ammonia, formed by the addition of the sesqui-carbonate of ammonia to neutralize the acidity of the solution. Its insolubility is doubtless due to the conversion of the per-tartrate of iron into a *proto*-tartrate by a new arrangement of its constituents, a change, which, according to Soubeiran and Capitaine, it is liable to undergo. This preparation, according to Phillips, has the following composition, viz.:

½	an atom	sesqui-oxide of Iron	40=18.18
1	"	Potassa, . .	47=21.36
2	"	Tartaric acid,	133=60.46
1	"	Tart. of Iron and Potassa,	220 100.00.

Hence the oxygen in the oxide of iron is to that in the potassa as 1.5 to 1.

In a paper published originally in the *Jour. de Pharm.*, and republished in the April number of this volume, by Soubeiran and Capitaine, the outline of a process is given for the preparation of tartrate of iron and potassa in a way

that the product contains a much larger quantity of iron than that of the London process.

The conditions necessary to bring about their result, are that bi-tartrate of potassa be placed in contact with an excess of hydrated sesquioxide of iron, and that they be exposed to a temperature not exceeding 140 degrees Fahr., for 24 or 30 hours. The following formula is founded on the idea suggested in that paper, and the excellence of the product which it yields, renders it deserving of the attention of pharmaceutists, viz.:

Take of, Precipitated Carbonate of Iron, three ounces,
Hydrochloric acid, ten ounces,
Bi-tartrate of Potassa, seven ounces and a half,
Water, a gallon and a half,
Solution of Potassa, five pints and a half,

Mix the precipitated carbonate of iron with the acid, and digest for an hour, or until the former is dissolved, and then pour the solution into a gallon of the water, and strain, if necessary. To this add the solution of potassa, wash the precipitate frequently with water, until the washings are wholly without taste, and while yet moist, mix it with the bi-tartrate of potassa, and half a gallon of the water. Keep the mixture at a temperature between 130 and 140 degrees Fahr. for thirty hours in a glass vessel, occasionally stirring, then filter the solution through paper, and evaporate to dryness by a similar heat, applied by means of a water bath.

It has been found, in repeating the above process, that the required temperature may readily be regulated by putting the mixture in a glass jar and placing it in a metallic vessel on a support, which vessel is then to be nearly filled with water. A thermometer should be suspended in the water, and heat applied by means of an alcohol lamp, until its temperature rises to 145 degrees; then by regulating the flame for half an hour it can easily be ascertained how large it is necessary to be, to keep up the required temperature, and the whole operation may be left to proceed for hours without any other attention

than an occasional agitation of the mixture in the interior vessel. Indeed in one instance the process was left in operation for seven hours, without the thermometer having risen higher than the required temperature, thus showing that what appears to be a troublesome piece of manipulation, is really very simple and easy. According to Soubeiran and Capitaine, the composition of the salt, when thus prepared, is as follows:

1 atom	Sesquioxide of Iron,	80	=30.77
1 "	Potassa,	47	=18.07
2 "	Tartaric acid,*	133	=51.16
1 "	Tart. of Iron and Potassa,	260	=100.00.

In this it is evident that the oxygen in the oxide of iron is to that in the potassa as 3 to 1. In the salt thus prepared there is forty per cent. more iron than in that previously described. Its color is dark brown, but when held in laminated pieces, between the eye and the light, it is ruby-red; it is perfectly soluble in water, with which it forms a dark brown transparent solution, and requires about four times its weight of that fluid at 60°, for solution. When this saturated solution is boiled it deposits a black matter, which is owing, according to Soubeiran and Capitaine, to the reduction of some of the oxide of Iron and the consequent decomposition of a portion of the salt. This preparation has less of the peculiar inky taste of ferruginous salts, than many of the compounds of iron; it contains thirty per cent. of sesquioxide of iron, and undoubtedly is one of the best preparations of this class. Like tartrate of antimony and potassa, this salt, is precipitated from its aqueous solution by an excess of alcohol, and in the form of a brownish yellow colored powder, which is as soluble as before. Owing to its insolubilily in alcoholic menstruua, it is necessary to dilute wine before it will take up sufficient to make a wine of iron of sufficient strength. One part of Madeira wine and as much water will dissolve about 1-21st of its weight of the salt, which is about a scruple to the ounce.

* The atom of tartaric acid in the paper of Soubeiran and Capitaine before alluded to, represents two, according to Turner.

In conclusion, it is observed, that the excellence of the product furnished by this process, has caused it to receive the sanction of the committee of the Philadelphia College of Pharmacy, now engaged in revising the formulæ of the United States Pharmacopœia.

ART. XXXIV.—ON PEPSINE, THE PRINCIPLE OF DIGESTION. By M. Wasmann.

In very extensive detail, M. Schwann has demonstrated that the gastric juice contains a peculiar principle, which he denominated *Pepsine*, although he had not obtained it in a pure state. M. Wasmann has succeeded in isolating this principle, which he considers to be contained in the grumous matter which fills the internal cells of the glandular membrane of the stomach.

M. Wasmann prepares Pepsine in the following manner: he washes the membrane, and digests it in distilled water, at the temperature of 30° to 35° c.: several hours after, he decants the liquid, and again washes the membrane with cold water, until it exhales a putrid odor. These liquors, mixed and filtered, yield a transparent, somewhat viscid liquid, possessing eminent digestive powers, especially when acidulated with hydrochloric acid. To procure the pepsine in a pure state, acetate of lead is to be added, the precipitate washed, suspended in water and decomposed by a current of sulphuretted hydrogen gas. The liquid separated from the new precipitate is acid and colorless. It is now evaporated to a syrupy consistence, at a temperature not exceeding 35° c., and absolute alcohol added, by which an abundant flocculent precipitate is produced, which when carefully dried assumes the form of a yellow, gummy matter, not attractive of moisture; this is the pure pepsine of M. Wasmann.

This substance is soluble in water, which it renders acid,

because it obstinately retains a certain quantity of acetic acid. A solution containing only $\frac{1}{50000}$ of pepsine, dissolves, in six or eight hours, the white of an egg slightly acidulated; but it loses its digestive power when boiled, or when saturated with potassa. In the latter case it deposits flocculi, which are insoluble in water, and slightly soluble in dilute acids, forming liquors of feeble powers.

Pepsine is recognised by forming, with acids, precipitates which are soluble in an excess of the acid. It is distinguished from albumen by the precipitates which acetic and hydrochloric acid occasion in its aqueous solution; and from caseum, by the ferrocyanide of potassa not precipitating its acid solutions.

A concentrated aqueous solution of pepsine is troubled by bichloride of mercury and acetate of lead, which form precipitates, soluble in an excess of the reagent, and in the acetic and hydrochloric acids. The sulphate of the protoxide and sesquioxide of iron, and the chloride of tin, likewise precipitate pepsine, and all the precipitates formed with metallic solutions possess the digestive properties.

When burnt, pepsine gives off the odor of burnt horn, and leaves a charcoal, difficult to incinerate, in which is to be found lime, soda, phosphoric acid and some iron.

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ART. XXXV.—ON RUNNET AND CHYMOSINE.

By M. Dechamps, Pharmaceutist at Avallon.

The runnet which is used in the neighborhood of Avallon to curdle the milk, is prepared in several manners ; the most common is made with the stomach of the calf; sometimes, however, the mucous membrane of the stomach of the hog is used.

If we examine the books to know what runnet is, we read, that the matter which is found in the stomach of ruminating animals is so called; or rather, that runnet is that which serves to curdle milk, as the flower of the artichoke, and the acid liquor which comes from the stomach of calves, kids, &c., because it thickens and curdles the milk. M. Berzelius, in his chemistry, applies this name to the mucous membrane of the stomach, and supposes that this membrane contains a peculiar matter which causes the milk to curdle.

This difference of opinion, the remarkable action of runnet, and its activity, attributed by some to the acid which it contains, and by others to a peculiar matter, excited me to undertake a series of experiments, tending to discover, if possible, the active principle of the runnet.

I prepared liquid runnet with alcohol of 27° c. and the stomach of a calf; eight drops of this runnet were sufficient to curdle a pound of milk.

This runnet was placed in a retort and distilled; the product was collected in a receiver, cooled by a current of water. The distilled liquid was slightly acid and had the odor of runnet. The residue was foul and very acid; its odor was that of cooked cheese.

I placed 750 grs., of milk in three vessels; I added to the first, five drops of the distilled liquor, to the second, five drops of the residue, and to the third, five drops of the distilled liquor, and five drops of the residue; no effect was produced.

I exposed to the solar rays, in the month of June, some runnet enclosed in a flask; it became foul and lost its action in milk.

I evaporated to dryness, 30 grs. of runnet, over sulphuric acid, and obtained a very active runnet.

Ten drops of runnet, put into 125 grs, of boiling milk produced no action.

I mixed 15 drops of runnet with 125 grs. of cold milk, and carried it to the boiling point as soon as possible; the milk was not altered.

Some runnet was saturated with calcined magnesia, three drops coagulated 250 grs. of milk.

I made the runnet alkaline with bi-carbonate of soda, and poured it into some milk; coagulation ensued.

I placed some runnet in a matrass, and heated on a salt-water bath; it began to loose its clearness at 45° c., and the cloud increased up to 60° c. Three drops of runnet, at 45° c., and eight drops, at 50° c., each separately, coagulated 125 grs. of milk. The coagulation with the latter, was more slow than with the former; the slowness of the operation is indicated by the amount of cream which separates. A coffee spoonful of the runnet, heated to 60° c., caused no change in 125 grs. of milk.

To ascertain which portion of the stomach produces the runnet, I dissected off the mucous membrane from a stomach, and placed the serous united to the muscular membrane, in 300 grs. of alcohol of 47° c.; after a maceration of three months I mixed, without any result, 20 grs. of this liquor with 125 grs. of milk. The mucous membrane was placed in 130 grs. of alcohol, of 27° c. After a month's maceration, the liquid had but a feeble action, for it required 20 drops to coagulate a pound of milk. I placed in the flask a little chloride of sodium, and obtained an active runnet; one drop coagulated 170 grs. of milk.

The mucous membrane of the stomach of a calf, which had been macerated in 375 grs. of alcohol of 27 c., and which produced a feeble effect; was withdrawn from the flask after macerating one month, was washed and placed in a flask with alcohol of 27° c. and 6 grs. of salt; the next day three drops coagulated 250 grs. of milk.

The mucous membrane of the stomach of a calf was exhausted* by macerations in alcohol and in water. The first was made with 800 grs. of alcohol, of 27° c., for seven months. The second were continued with 8000 grs. of water, and did not last more than twelve hours each. After this, the mucous membrane was dried; it no longer reddened litmus paper, when pressed on the moistened inner membrane. A part of this dried membrane was placed in 1800 parts of unskimmed milk, and the temperature raised to 50° c.; at 45° c. the coagulation was complete. The membrane was separated, washed, dried, and weighed; there was no loss. This membrane was placed in a quantity of milk equal to the former, the milk was heated to 50° c., and, as should happen, there was no action.

Boiling milk was not altered when I placed in it the exhausted mucous membrane.

Having ascertained that the active principle of runnet was produced by the mucous membrane of the stomach, I examined whether any other portion of the digestive tube contained it, and whether this matter was peculiar to the mammalia. It resulted from these researches, that this matter was not contained in any other part; that it does not exist in the craw of the Gallinaceæ, but that it may be found in the mucous membrane of the gizzard of these animals, &c., that it is peculiar to the stomach of all animals, (I generalize by induction,) and that its functions are essential for digestion, inasmuch as it favors chymification.

Liquid runnet is slightly amber-colored, when prepared with the stomach of a calf and alcohol of 27° c. Its odor is like butter, and its reaction with test paper is acid. When saturated it becomes foul and disengages ammonia. When saturated with ammonia and filtered, there is obtained a transparent liquor with the odor of runnet, but which has no action on milk, for six coffee-spoonfuls had no effect on 125 grs. of milk. If the filtered liquor be set aside in a corked flask, it deposits

*This experiment differs somewhat from that of M. Berzelius.

on the sides of the flask small crystalline grains, which are composed of phosphate of lime, and phosphate of ammonia and magnesia; the filtered liquor was acidulated with tartaric acid, introduced into a retort, and distilled so as to obtain 500 grs. of product. These 500 grs. were saturated with ammonia, and 250 grs. were distilled over; the residue was neutral; tartaric acid was added, and the distillation continued. These two products were saturated with potassa, and evaporated; they contained, the first, capric acid, and the second caproic and butyric acids. In another experiment, the first distillation was continued to obtain a greater quantity of product, and contained capric and caproic acids, while the second contained butyric acid.

Runnet contains:

Hydrochloric acid in large amount.
Butyric "
Caproic "
Capric "
Lactic "
Hydrochlorate of ammonia.
Chloride of Soda, independent of any added, but the addition of this salt augments the secretion of the hydrochlorate of ammonia.
Magnesia, not as an ammoniaco-magnesian-phosphate.
Soda, probably with the magnesia, as a lactate.
Traces of a sulphate.
Phosphate of lime.
And a peculiar matter, which I name *chymosine*, from χυμος, chyme; χυμοσις, chymification.

To obtain impure chymosine, a small excess of ammonia is added to runnet. The precipitate is filtered, washed and dried. Dry chymosine resembles gum, or emulsine. Hydrated or dry, it is insoluble in water; its insolubility is so great, that after being immersed several hours, it may be powdered under this liquid; but it is soluble in acidulated water. This solution exercises the power of curdling milk, but is not as

energetic as runnet; that is to say, the quantity of chymosine extracted from a given amount of runnet, will not reproduce the same amount of runnet. This action proves only that the property is not destroyed in chymosine when isolated.

Water acidulated with sulphuric acid, &c., separates from the chymosine the phosphate, which precipitates with it.

A solution of chymosine is precipitated by all the alkalies, the carbonates of potassa and soda, ammonia, and by tannin.

Iodic acid is decomposed and iodine liberated, when poured into this solution.

Chymosine burns with flame, and leaves a brilliant charcoal.

I may conclude from the preceding statements :

That the name runnet applies to the mucous membrane of the stomach ;

That runnet may be concentrated without alteration ;

That runnet does not act upon milk in consequence of the acid which it contains, because it operates after saturation, because the heat of the solar rays, and a temperature of 60° c., deprive it of this power, and because heat produces on the mucous membrane an effect similar to that upon runnet ;

That chymosine is the active principle of runnet;

That the action of isolated chymosine cannot be attributed to the acid used to dissolve it ;

That chymosine is secreted by the mucous membrane of the stomach ;

That the quantity of chymosine necessary to coagulate 1000 grammes of milk is excessively feeble, since it may be effected by eight drops of liquid runnet, and since a portion of mucous membrane of the stomach of a calf, perfectly exhausted, did by the assistance of 45° c., coagulate 1800 grammes of milk ;

That the acidity of the runnet favors its action;

That a temperature of 20° to 25° c., is very favorable to the action of runnet;

That chloride of soda acts as a stimulant on the mucous

membrane of the stomach, and this action augments the secretion of chymosine ;

That the action of chymosine cannot yet be explained, and that, saying that the caseous matter undergoes an isomeric change through the influence of chymosine, or that the action takes place in consequence of a catalytic force, only sets the mind at rest, without explaining the phenomena.

I have given the name of *chymosine* to the matter secreted by the mucous membrane of the stomach, because this name reminds only of chymification ; or the first part of digestion, while the word peprine (pepsine ?) recals the idea of digestion as a whole, that is chymification and chylification; also because we perceive the aliments converted into chyme, but are not able to detect the passage of chyme into chyle.

If we may apply to living organs, observations made on these organs after the death of the animal, it will be easy to explain some parts of the phenomena of digestion.

When an animal takes into its mouth, nutritive matter, the digestive apparatus is excited, the saliva flows, is mixed during mastication with the aliment which its renders alcaline. Mastication completed, these matters enter the stomach, meet the gastric juice by which the free soda is converted into chloride of sodium. This chloride excites the action of the mucous membrane and increases the secretion of chymosine, which finds a solvent in the excess of hydrochloric acid contained in the gastric juice. The matters accumulated in the stomach, are agitated by the movements of this organ, penetrated by the gastric juice, and gradually converted into chyme, under the influence of the temperature, the chymosine and its solvent. This operation finished, the chyme passes the pylorus, and mixing in the duodenum with the pancreatic and hepatic secretions, is necessarily modified by their action, previous to being offered to the lacteals. If any disease should change the chemical nature of the secretion from the mucous membrane of the stomach, the chymosine would be without action ; for though secreted, it would not meet with a liquid capable of precipitating it, and digestion would not proceed properly; on

the contrary, if the acidity of the gastric juice is too great, this liquid would exercise too much action on the mucous membrane, and the animal would be harassed, &c.

This theory, it is true, does not explain all the phenomena of nutrition ; but it accounts with probability for the use of the saliva in digestion ; for it appears impossible to admit the principle, that the free soda of the saliva acts as a solvent of the aliments, since, as in man, these matters remain but a short time in the mouth, and pass without stopping into the stomach, where they meet an excess of hydrochloric acid, and the alkalies cease to remain uncombined. For those animals, which like the Ruminatia, have several cavities, in which the aliments remain, this explanation is more easy of adoption, but as the food of these animals are of difficult digestion, it is necessary to retard its entry into the stomach, that it may be the more effectually divided and softened, before it is offered to be converted into chyme, and these macerations do not sustain the dissolving theory, although supported by the solution of vegetable albumen, since this solution takes place, according to the experience of the laboratory, without the presence of an alkali.

In the Gallinaceæ, &c., the nutritive matters remain a long time in the crop, before they penetrate the gizzard, and in their passage meet with an acid liquor only.

This theory, which is corroborated by the use of sea salt in the preparation of our aliments, by its well established digestive action, and by the presence of hydrochloric acid, and chloride of soda in all stomachs, explains also in an indirect manner the action of bi-carbonate of soda in difficult digestion ; for this salt acts upon the acid, by means of its base, and by the resulting chloride of soda, and not by a solvent action, since this is not more probable than the solvent action of the saliva in mastication.

Journ. de Pharm.

ART. XXXVI.—ORGANIZATION OF PHARMACY IN NORWAY.

By M. Martins.

In Norway, as in Denmark and Germany, the number of shops are limited, so that he who exercises the profession of an apothecary, can support himself in an honorable way, without being constrained to falsify his medicines in order to obtain subsistence. It has been established as a principle, that one apothecary should administer to 10,000 people, and as Norway is little inhabited in proportion to its extent, there are but *thirty-five* apothecaries in the whole kingdom; eight in the cities of Christiana, Drontheim, Bergen, and Christiansand; the others are distributed in the small towns and villages.

The privilege of a shop, once accorded by the state, cannot be taken from the proprietor, but by a decree of the competent tribunals, in the case of his having proved unworthy of exercising his profession, either by selling altered drugs, or in any other way. The privilege is then transferred to another apothecary, in whom unite all the conditions imposed by law. Except in these cases, which are very rare, the children, the pupils, or even strangers succeed to the right. The number of apothecaries being very small, the value of a shop, varies from fifty thousand francs, to one hundred thousand, comprising the house and stock. The payment is at intervals, and as the possessor is certain to prosper, it often happens that a young apothecary, without fortune, can acquire a shop of high cost. The right is also possessed of conducting the establishment by a provisionary title, which places it in the hands of a son, to exercise his profession, when he is of age, and has furnished proof of capacity.

It was necessary to avoid the abuses which appertain to a right possessed by apothecaries, in most countries, of fixing themselves the prices of medicines, which price is lowered by competition. This is remedied by establishing a tariff, which is accomodated to the fluctuation of prices in simple

drugs; and secures to the apothecary a profit of one hundred and twenty-eight and four-sevenths per cent. This profit is not too great, if it be recollected, that in Norway the navigation is interrupted during eight months of the year, and that then the apothecary is forced to have all the substances which in other countries are bought ready prepared by the chemical manufacturer. The law states expressly that chemical substances, salts for example, must be prepared by the apothecary, which affords a guarantee to the buyer, and also contributes to the instruction of the pupils. It is true, nevertheless that the apothecaries of Norway, have commenced to procure their products ready made from Hamburgh, or the manufactory of Schohenbeck, near Magdebourg. The government itself has produced this result, by taking as the basis of prices, the price current of Hamburgh ; which prevents the apothecary himself from manufacturing, as he could not compete with the manufacturers' prices. It was in 1813, that the profit of the apothecary was fixed at the sum stated above. To establish it, the charges which weigh upon the apothecary are taken, the estimation of which appears to us so curious, that it is proper to report it. Rent and utensils 6,000; maintainance, 1,000; three pupils, 2,000; wages of workmen and boys, &c., 4,500; lights and fuel, 1,000; loss on merchandize 600; taxes, 1,000; expenses of the apothecary, 6,000; purchase of medicines, 17,500;—total, 40,000 francs. M. Martins enters into circumstantial details upon the principal rules which have been established, to calculate the price, either of simple medicines or compound substances, or lastly of chemical compounds, which is much more difficult.

The appearance of homœopathic medicine, which in all countries has caused some injury to pharmacy, but only for a short time, has caused in the regulations a modification which went into operation in September, 1830. Sixteen and two-thirds per cent. were added to the disbursements of the apothecary, so that a medicine, which in Hamburgh cost 100 shillings, would sell for 355 in Norway.

Although the whole of these arrangements reconcile the

interests of the public and those of the apothecary, they give rise nevertheless to some abuse. The price of dear substances, such as musk and opium, is still above the profit allowed by law to apothecaries ; it results from this, that the merchants bring large quantities, which they sell in secret. This abuse has led to the idea of adopting the Prussian tariff, in which all medicines are arranged according to their value, and according to the more or less frequent use of the medicine. The establishment makes a large profit upon the products which are little costly, and used in small doses; its gain upon the dear articles is on the contrary very small. The interest of the apothecary, and that of the patient, is to use medicines of a moderate price, in all cases where high priced substances can be substituted by others of less cost.

To compensate for the charges imposed upon apothecaries in Norway, there have been accorded to them some privileges. They can sell, at 20 per cent. reduction, medicines to physicians who practice in the scattered villages, and who themselves are forced to furnish them. The medicines for the use of the hospitals are bought without any reduction, because, as it is thought that the increase of these establishments diminishes the number of patients, it was but just that the interests of the apothecary should not suffer. If there are two apothecaries in a town, they furnish by turns the medicines to the hospital.

With such securities, the apothecary in Norway is sure of an honorable living ; and the physician and the patient can depend upon the efficacy of medicines. "Without doubt," says M. Martins, "some abuses exist as elsewhere, but they are inconsiderable in comparison with those under which we groan in France ; they are confined to these, that one apothecary will make greater weight than another, or will endeavor to insinuate himself into the good graces of the physicians ; but each of them being sure of making a living for his family, no one would have recourse to *lying publicity* or to shameful manœuvres to take advantage of depravity, ignorance, or credulity.

The physicians of the cantons, are charged with overlooking the apothecaries. Every drug of bad quality, or falsified, is immediately destroyed; if directions are badly executed the apothecary is fined, the same is the case when he gives energetic medicines, or delivers written consultations. The first fine is 500 franks, the second 1,000. He is forbidden to sell secret remedies, and to advertise them. It is seen that in this point of view Norway is more advanced than France, as no where are seen those disgraceful and scandalous placards which place the profession of pharmacy in so unfavorable a light.

For selling medicines without the privilege of an apothecary, the individual is punished with imprisonment, from a month to six months. He who practises this profession is certain of possessing an honest competency at the termination of his career, if he strives to merit the confidence of the public, which is accomplished by honorable means. The shops of Drontheim are characterized by admirable simplicity; no paintings upon the walls, no signs upon the windows, nor that ruinous ostentation which is met with in our shops.

The following is the law which regulates the study of pharmacy; it is necessary that it should be as wise and perfect as that which regulates the exercise of the profession. The studies have been organized conformably to a law which dates from 1672, and which still regulates them. The élevès must be chosen from those who have studied in the secondary schools, and who are consequently familiar with Latin. They commence in the shops by learning the price of medicines and the elementary principles of the Pharmacopœia; still later, they put up prescriptions under the direction of the assistants. When the apothecary has become familiar with their capacity, he gives to them a certificate, with which they present themselves before the physician of the district, who examines them, and presents them with a testimonial by which they are declared capable of exercising the functions of assistant in a shop. In this arrangement there is an evident defect, for the physician is not always a good judge in matters

of chemistry, of pharmacy, and natural history. On this plan also, there is taken from the apothecary a right, which ought to belong to him, since it is under his jurisdiction that the assistant obtains a situation. After having performed the offices of a shop for instruction, the pupil proceeds to Christiana to follow a special course, and finally to appear before a board, who subject him to every method of examination.

The written trial consists in the description of one or more preparations and the phenomena which accompany them. If the trial is not satisfactory to the examiners, the candidate is sent back for a longer or shorter time. The verbal examination has for its objects, botany, zoology, mineralogy, chemistry, pharmacy, the laws which govern it, the mode of preparation and purchase of substances. It is requisite in addition that the pupil should recognise and name the simple drugs, which are presented to him ; the practical trial consists of the preparation of a medicine and the chemical analysis of a body. In the certificate, which is delivered to the candidate, it is specified whether his examination has been good or indifferent. This certificate confers the right of practising pharmacy in the whole of Norway and of buying a shop.

The first obstacle which the re-organization of pharmacy met with in France, arose in a great measure from this, that as all the professions were free, the number of shops could not be limited. It has been asserted, that to wish to do this would be to bring back the establishment of those rich and powerful corporations which have existed even to the last century, and of which the creation is repugnant to our constitutional principles. We must confess that this is an objection which is not easily removed.

Without hesitation, we cannot but admire with M. Martins, the instruction and noble simplicity of the apothecaries of Norway, who not having to fear failure, devote themselves entirely to the exercise of a profession, which they so well know how to ennoble. But we must also remark that their position has no analogy with that of the French pharmaciens. These obliged, like other professions, to struggle with

competition, have too often recourse to means which disgrace the character of men pursuing the study of the most attractive natural science. Pharmacy, unhappily, has been coerced to submit to the common law which regulates other professions; there have been established cheap shops, which lead the public to believe that if the price of medicines is so high, it is because the persons who sell them wish to receive too much profit from them. If the public mind, so bad a judge in this matter, has become once thus possessed, it will happen that pharmaciens, the most devoted to their art, and the most disinterested, will experience the common destructive influence.

Journ. de Chimie Medicale.

ART. XXXVII.—ON PAULLINIA, A NEW MEDICINAL SUBSTANCE. By Dr. Gavrelle.

Paullinia is an extract from a plant of the same name, originally from Brazil, which extract is prepared by the Indians, and appears to possess a very energetic stimulating action. M. Gavrelle has presented a specimen to the Society of Medicine, together with a new alkali, which two chemists of Paris had separated by analysis. The extract and alkali are very bitter and exhibit great analogy with caffein.

It is probable that Paullinia, or the extract which bears this name, is extracted from several plants of the genus Paullinia, which contains thirty-one species, and is of the natural family Sapindaceæ; and Octandria, Triginia, in the artificial arrangement.

This genus has received its name from being dedicated to Simon Paulli, a physician and botanist, who was born at Rostook in 1603, and died at Copenhagen in 1780. This physician was the author of several works, and more notably of *Quadripartitum de Simplicium Medicamentorum Facul-*

tatibus, 1668, in 4to.; a work upon the abuse of tea, tobacco, &c.

Paullinia Africana is employed in Senegambia to arrest hæmorrhage, by the application of the powdered bark to the wounded parts. The bark of the *P. Asiatica* is used at Bourbon as a febrifuge ; in India, the bark, the leaves, and the fruit, are employed as a decoction, prepared with four grammes of these substances, as a remedy for venereal complaints, rheumatism, gout, and cutaneous affections.

The seeds of *P. eupana* are used by the Indians of Oronoko; they mix them with cassava and water, and leave them in contact. When the liquid mixture begins to putrefy, which is denoted by becoming of a yellow color, and acquiring a bitter taste, they draw off the clear portion and mix it with the water which serves for their common drink.

P. Mexicana possesses, according to Hernandez, the properties of sarsaparilla.

The seeds of *P. pinnata* are stupifying; they answer in Brazil and the Antilles to poison fish. The leaves of Paullinia are, according to Pitron, vulnerary. The *P. serjania* also furnish seeds, which produce drunkenness.

Finally, according to Martins, an extract is prepared from the *P. sorbilis*, known in Brazil under the name of *guarana*, which is a medicine composed by the Indians of Para, and is made up by them in the form of lozenges, weighing 125 to 250 grammes.

The color of the guarana is brown, and in the mass is composed of lumps which are less colored interiorly than on the surface. This product is hard, very light, inodorous, and of a slightly bitter taste, without any sensible astringency. Gomez states, that the guarana is efficaciously used in Brazil for dysentery, and for diseases of the urinary passes produced by relaxation, four to six grammes being taken in a glass of water ; according to M. Batka, the guarana contains a vegetable alkali called guaranine.

M. Gavrelle gives the following details on the Paullinia which he has frequently used; he states that it is the product

of the *P. sorbilis*, family *Sapindaceæ*, of which the fruit bears great resemblance in color to the cocoa, its odor is *sui-generis*, its taste bitter, analogous to that of rhatany.

It is prepared by separating the seeds from the capsules, exposing them to the sun, until the integuments will separate by simple pressure; they are then reduced to a fine powder.

M. de Chastetus has found in them, gum, amidon, a brownish red resinous matter, and a crystallizable matter, which possesses the chemical properties of caffein.

In Brazil and the neighboring countries, it is given as a drink mixed with cocoa, for dysentery, and as a tonic. Since it has been brought to France, M. Gavrelle has employed it with success in chlorosis, tedious convalescence, paralysis, the looseness of phthisis, headach, &c., by which it may be seen that its use is similar to that of *guarana*.

Mode of administration.

From numerous experiments carefully made, we are led to the conclusion that the extract made with diluted alcohol, is the preparation which would most exactly represent the properties of the plant.

1. *Lozenges of Paullinia.*

Hydro-alcoholic extract, 21 gram. 3 dec.
Sugar, scented with vanilla, 560 "
Make into lozenges, each containing 6 decigrammes.

2. *Syrup.*

Hydro-alcoholic extract, 10 gram.
Syrup, 1000 "
Fourteen grammes may be given in a day.

3. *Pills.*

Hydro-alcoholic extract, q. s.
To be made into pills containing each a decigramme, with a sufficient quantity of powdered liquorice.

4. *Powders.*

Powder of Paullinia,	4 gram.
Scented sugar,	16 "

Mixed to form one dose.

5. *Tincture.*

Hydro-alcoholic extract,	32 gram.
Alcohol of 22°,	500 "

6. *Ointment.*

Hydro-alcoholic extract,	8 gram.
Lard,	64 "

Journ. de Chim. Med.

ART. XXXVIII.—CHEMICAL EXAMINATION OF THE BARK OF QUILLAIA SAPONARIA. By MM. Henry, Jr., and Boutron Charlard.

MM. L. Eveille, member of the Royal Academy of Medicine, some time ago, sent to us some pieces of bark collected in Chili, and produced by a tree known by the name of *Quillaia saponaria*, which he desired us to examine. It is the result of the experiments upon it which we now present to the Academy.

There is found in the abridgement of the History of Chili by Molina, a detailed description of the tree which furnishes this bark. It is thus expressed: *Quillaja Saponaria, gener. nov. Folia alterna, ovato-oblonga indivisa, denticulata, sempervirentia, petiolata. Pedunculi axillares; flores masculi et feminei in eadem ramo; calyc. foliolis oblongis persistentibus; stam. capillaria, long. calycis; antheræ subrotundæ; germ. subrotundum; styli subulati, capsula subquadrata.*

The trunk of the *Quillaia saponaria* is strait and somewhat elevated; it is covered with a thick bark of an ashen gray; near the summit, it is divided into two or three branches. Its leaves are much like those of the green oak, its flowers are similar, as regards the stamina, but the seeds are enclosed in a capsule with four cells, each containing a seed.*

*The generic description given by Molina, but which has not been appended to this notice by the authors, is inaccurate, hence some little difficulty has arisen with respect to the tree, in the compilation of systematic works. Ruiz and Pavon, the authors of the Flora Peruviana and Prodromus Floræ Peruvianæ et Chilensis, have detailed its characteristics under the name of *Smegmadermos emarginata*. They state that the plant is the same as that referred to in the work of Molina. That the description given by him is erroneous, is admitted by his translator and editor, M. Gruvel, who says, "I am ignorant, from the description given by the author, of what tree he speaks, but I have seen the fruit of the *quillai* of Chili, and which has been given to me under the name of *Cortex saponarius*, brought by M. Dombey. Now this fruit is composed of five capsules, disposed in a star-like form in a common calyx; each capsule is unilocular, and contains several seeds winged at the end, &c." De Candolle, in his Prodromus Plantarum, has admitted the species of Ruiz and Pavon, and has given to it the name of *Quillaia smegmadermos*, at the same time that he has introduced the plant of Molina as of doubtful exsistence under the name of *Q. saponaria?* This botanist had seen specimens but of one species, which alone by the authors of the Flor. Peruv. is asserted to exist. In a collection of plants presented to the Academy of Natural Sciences of Philadelphia by Dr. Styles, formerly a resident of Chili, is contained the species which may be regarded as the true one of De Candolle, as it agrees in all particulars with the account given by this compiler, and with that of Ruiz and Pavon. The following is the description:

Quillaia smegmadermos, Nat. Fam. *Rosaceæ*, Class *Dioica*, Order *Decandria*. De Cand.

Generic characters.—Flowers polygamous by abortion; calyx *five-cleft*, persistent, segments ovate acute, before expansion valvate; corol. petals five, subspathulate, narrow, spreading, hardly longer than the calyx, inserted upon its divisions. Nectary, disk flat, star-shaped, covering the base of the calyx, emarginate and shining; stamens ten; filaments erect, exterior five emarginately inserted upon the nectary, interior five inserted below the disk; anthers in the female flowers sterile, in the male ovate, bilocular, and dehiscent longitudinally. Pistil, germs five, oblong; styles subulate, stigmata capitate; capsules five, oblong,

The wood of the *Quillaia* is hard, reddish, and does not split; the Chilians employ it to make stirups, but the quality which they esteem the most in this tree, resides in its bark, which, when pulverized and macerated in water, produces as much suds as the best soap. This suds is excellent for the removal of stains and grease from linen and cloth, which it completely cleanses. The name originates in the Chilian verb *quilloan*, meaning to wash.

The pieces of bark which have been sent to us are rugose, cracked, fibrous, and of a grayish color exteriorly, whitish interiorly. When broken, there are perceived innumerable small brilliant points. They furnish a grayish powder, having no taste at first, but soon followed by a strong biting impression. It excites considerable cough and sneezing.*

marked at the apex with the remains of the style, spreading in the form of a star, one-celled, superiorly bivalved, valves turned outwards; seeds many, obovate imbricate, at the apices alated. Dec. and R. and P.

J. C.

* The following extracts are from a letter of Dr. Ruschenberger of the United States Navy, to the editor of the American Medical Intelligencer, September 15, 1840.

"I spent the first half of the year 1827 in Chili, and there became acquainted with the quillai bark, and though I was told it was used medicinally by the Indians or aboriginal natives, I never learned any thing in relation to its specific application. As I have stated, it was known more for what might be considered its domestic virtues than medicinal qualities. On my return from Chili in the autumn of 1829, I brought some of the bark to this city; but I do not know that I was the first who did so. I spent some part of the years 1831, 2, and 3 on the coast of Chili, and when I left Valparaiso in October, 1833, the extract of quillai was not known there. I brought home with me a very considerable quantity of the bark, for the purpose of causing experiments to be made with it, to ascertain whether it might not be useful in the arts; and about the same time several tons of the bark were imported into Baltimore. In April, 1835, I received a letter from my friend, Dr. J. Styles, of Valparaiso, informing me that a foreign pharmaceutist had prepared an extract from the quillai, from which he hoped to derive great benefits, if experiment should prove the extract to be a valuable medicine, as was suspected. As I was on the eve of departure from the United States, I was not able to cause its virtues to be tested, as I had been requested to do.

Analysis.

The powdered bark of *quillaia* was at three different times boiled in water. The solutions were united after filtration, and had a yellow color, a little thick, and slightly viscid. Evaporated to dryness, in a salt water bath, they left a shining extract, of a pretty deep reddish-brown color, scarcely

"When in Chili, in 1827, the fluid extract of quillai was not in general use as a medicine; but chiefly known as a cleanser of woollen and silk stuffs, and a promoter of the growth of hair. Its application was not more extended than the bark itself, which is not used for common laundry purposes in Chili—at least not upon the coast; perhaps for the reason that the tree does not sufficiently abound in the country to render its bark procurable at an expense which would bring it into competition with soap."

"The quillai bark is brought to market in bales, or rather bundles, containing each from one to two hundred or more pounds. The bark is in pieces of from three to five or six feet long, from two to eight inches wide, depending very much upon the size of the trunk from which it may have been stripped. The tree grows sometimes to the height of 40 or 50 feet, having a diameter at the ground of from one to two feet."

"Externally the bark is rough, and of a deep reddish-brown color; its internal surface is smooth, of a cream white, which darkens by age; and when recently dried, is almost entirely covered by minute crystalline particles. When broken, the inner bark is found to be tough, compared with its outer covering, and may be stripped into ribbons and pliant shreds several inches in length. The interstices of its fibres seem to be full of an almost impalpable powder, which is cast out when the bark is fractured, and when brought in contact with the lining membrane of the nose, excites sneezing, and sometimes a slight sense of stricture about the fauces. Its taste is peculiar; at first slight, then sweetish, warm, and finally leaving an unpleasant impression upon the fauces like that produced by chewing senega, which endures for some time. The old bark floats in water until it becomes thoroughly wet, when it sinks. If steeped in cold water for eight or ten hours, in the proportion of a handful of shredded or coarsely powdered bark to a gallon of water, it produces an infusion of the color of common ley, which, when agitated, presents upon the surface a resemblance to soapsuds.

"From what I have seen of the effects of this cold infusion, I should be disposed to give it a fair trial as an injection in leucorrhœa, with an expectation of very decidedly favorable results, probably more remedial than those which have been derived from a similar application of the monesia in this affection."

sensible odor and a taste extremely pungent, somewhat resembling that of pyrethrum. This extract (A) treated with rectified alcohol, but partially dissolved. The boiling filtered decoction was of a slightly amber color ; by cooling it became cloudy, and deposited a whitish flocculose substance (B) which was collected by a filter.

This matter, which had a hydrated appearance, became considerably reduced by dessiccation. It was then friable, cracked, and closely resembled, as regards physical characters, small fragments of Turic gum. It had no odor ; its taste, at first slightly sugary, soon became very pungent. Re-dissolved in boiling alcohol and decolored by animal charcoal, it was allowed to undergo spontaneous evaporation ; after several days it dried in transparent plates, presenting no signs of crystallization. Moistened with a small quantity of water, it swelled, became opaque, and appeared to become hydrated. By dessiccation it soon assumed its first appearance. Dissolved in water, and placed in contact with a little yeast, a slight fermentative movement took place in the interior of the liquid with the developement of a feeble alcoholic odor.

Treated with nitric acid assisted by heat, this matter dissolved; but after twenty-four hours there was precipitated to the bottom of the capsule, a powder of a canary yellow color, which was separated from the supernatant liquid, and which, when washed, had a well marked bitter taste. The first washings produced in the salts of lime a granulated precipitate. The yellow powder remaining upon the filter, was very soluble, even in cold alcohol at 36°, the solution, evaporated cautiously, left a yellow coloring substance, which appeared to be the result of the action of nitric acid upon the pungent matter.

Some decigrammes of the pungent matter (B) were dissolved in a small quantity of distilled water; they communicated to this liquid an opaline tint, and the property of frothing by agitation. The liquid, tested by several reagents, presented the following phenomena :

The subacetate of lead occasioned in it an abundant curdled precipitate ;

The nitrate of silver, a light degree of cloudiness;

The nitrate of baryta, no change ;

Ammonia augmented the intensity of the color.

The salts of platina indicated the presence of a small proportion of potassa.

The residue of the alcoholic solution from which the pungent substance (B, which has occupied us,) was precipitated, was evaporated by the heat of a salt water bath ; there remained a clear brown extract (C) possessing a great part of the properties of the afore-noticed, but much less pure than it, reddening litmus. When dried it was less friable, which, doubtless, appertained to a fatty substance. We were convinced of this, by treating it with sulphuric ether, which left, after its entire evaporation, a greasy matter mixed with a little chlorophylle.

A portion of this extract was boiled with an excess of caustic magnesia; the precipitate re-dissolved by boiling alcohol, after a slow evaporation, afforded no indication of crystallization. With respect to the acid which was combined with the magnesia, the quantity was so small, that it was impossible to determine what it was.

It has been seen above that the extract obtained from the aqueous decoctions, was treated by rectified boiling alcohol. Which only took up a portion of it; the portion untouched (D) was of a blackish-brown color, dry, friable, cellular, without sensible taste. Cold water allowed to remain in contact with it, became strongly colored without appearing to dissolve it entirely. This liquid, filtered and evaporated, left as a residuum, an insipid substance, colored brown, foaming considerably by agitation in water. Treated with nitric acid, to see if it contained gum, no traces of mucic acid were perceptible.

Calcined in a crucible, it exhaled an aromatic odor, which had some resemblance to that of terebinthinate substances. The ash of calcination was a whitish powder, abundant, effervescing with acids, and which was composed of a considera-

ble proportion of lime, and a small quantity of the phosphate of this base. We think that the carbonate of lime came from the decomposition of a vegetable salt, which we believe to be the submalate, and which in another experiment was deposited spontaneously in the liquid.

Different reagents occasion marked changes in the aqueous solution of this substance. Ammonia produces slight cloudiness, and the color augments in intensity. Lime water forms with it a flocculose precipitate, soluble in the acids; the nitrate of baryta, a deposit equally soluble in these agents; the oxalate of ammonia indicates the presence of much lime; and the nitrate of silver, traces of the hydrochlorate.

The portion of the extract upon which cold water was without action, was treated with boiling water, the decanted liquid was treated with the tincture of iodine, by which was recognised the presence of amilaceous fecula.

By boiling the bark of the *quillaia*, which had been subjected to boiling water, with hydrochloric acid, there was dissolved a large proportion of the salts of lime, composed of a small amount of the phosphate, and another, which we supposed to be a malate, as above. There was also found an oxide of iron, but not the sulphate. Finally, we did not examine for silica, its presence appeared to us without interest, and the small quantity of bark which we had at our command did not permit us much to vary our experiments.

To resume, the bark of *quillaia* contains:

1. A peculiar matter, exceedingly pungent, soluble in water and alcohol, foaming by agitation with water, drying in thin transparent plates.*

* The peculiar principle here detected is *Saponine*, which exists in other vegetables, as the *Gypsophila struthium*, *Saponaria officinalis*, *Sapindus saponaria*, *laurifolius*, *and rigidus*, the *Leontice leontopetalum*, &c. It has been studied by Bucholz and Bussy. The following account of its properties is taken from a paper of the latter, on the root of the *Gypsophila struthium*, in the xix. vol. of the Journ. de Pharmacie.

Saponine is white, uncrystallizable, endowed with an acrid taste, which is pungent and very persistent; it is friable. Reduced to fine powder, it

2. A fatty substance united with chlorophylle.
3. Sugar.
4. A brown coloring matter, becoming deeper by alkalies.
5. Gum, (traces.)
6. A free acid.
7. A vegetable salt; the base lime, (malate?)
8. Amidon.
9. Salts, { hydrochlorate of potassa, phosphate of lime.
10. Oxide of iron.
11. Lignin.

is strongly sternutitory. It is soluble in water in every proportion like gum. Its solution is cloudy, but when it has been filtered a number of times, it is transparent; this solution, even when very dilate, froths much by agitation; it is sufficient, if water contains a thousandth of its weight, for this effect to be considerable. In an equal weight it does not form with water a mixture as thick as gum. Evaporated to dryness, this solution leaves saponine under the form of a shining crust, easy to detach and to reduce to powder. Alcohol at all degrees of strength dissolves it, but the power of solution diminishes in the higher degrees. It is dissolved by boiling alcohol at 40°. Weak alcohol dissolves it in all proportions. When obtained from the alcoholic solution, it absorbs the moisture of the atmosphere, and becomes soft and adherent. Ether possesses no action upon it. Exposed to heat, it swells, blackens, does not volatilize, but furnishes an empyreumatic acid oil; in the atmosphere it is inflammable, giving off smoke and an aromatic odor. The acids produce no effect upon the aqueous solution. Hydrochloric acid augments its solubility in alcohol. Nitric acid exerts a peculiar action upon it. The substance is at first dissolved without any reaction except the production of a light yellow color, but by the application of heat, the liquid undergoes a kind of coagulation, like albuminous water. When the reaction energetically takes place with the extrication of suffocating gas, the substance becomes tumid, there is finally formed upon the surface of the liquid a yellow resinous matter, when the action of the nitric acid has terminated. M. Buzzy regards saponine as intermediate between gum and resin. The following is the approximative composition which he gives of it:—

Carbon, - - -	51.0
Hydrogen, - - -	7.4
Oxygen, - - -	41.6
	100.0

J. C.

ART. XXXIX.—ON THE LAURUS CASSIA OF LINNÆUS, AND THE PLANTS PRODUCING THE CASSIA BARK OF COMMERCE.

By Robert Wight, M. D.

My attention was first directed to this subject by a communication from Government, in which I am requested to endeavor to ascertain "whether the common Cassia Bark of the markets of the world is a thicker and coarser portion of the bark of the genuine cinnamon plant or tree, or whether it is the bark of a plant not analogous to the cinnamon plant or tree."

Before it was possible to return a satisfactory answer to this question, it seemed incumbent on me to ascertain what plant Linnæus meant to designate under the name of *Laurus Cassia*, and whether it was probable the plant so called could supply all the bark passing under that name in the markets of the world. This primary, but most difficult inquiry was rendered indispensable by the, generally supposed, ridiculous assertion of Mr. Marshall, that the leaves, and the bark of the trunk and branches of the *Laurus Cassia* of Linnæus, so far from being aromatic and spicy like cinnamon, are bitter, and have in a slight degree the taste and odor of myrrh. This assertion, wide as it may appear of the truth, is yet founded in fact, and what may appear still more extraordinary, has led to a discovery, which, without such aid as he has given, would not probably have soon been made by a professed botanist, a title to which I believe Mr. Marshall does not aspire. He appears to have been led to the discovery, that the *Laurus Cassia* of Linnæus did not produce aromatic bark, simply through the native name, and wonders how it could have received from him the name of *Cassia*, and had qualities attributed to its bark which it does not in the slightest degree possess. I think I can now answer the question, and explain the mystery which has so long hung over this species, and been hitherto rendered only more obscure by each attempt to bring it to light.

It is well known to modern botanists, that many of their earlier predecessors were but indifferent describers of plants, and often very loose in their quotations of figures as synonyms, a sin of which Linnæus was often about as guilty as any of his contemporaries. He seemed to have had an idea, that their figures were generally at best but approximations to the truth, and that if a figure exhibited even a remote similarity to a plant before him, especially if from the same country, he might with safety quote it as a synonym. Bearing this in mind, we can easily account for a number of errors to which his incorrect synonyms have given rise. The present instance affords an excellent example of what I have here stated, and one which, but for the discovery of Mr. Marshall might have long remained undetected.

In Herman's herbarium of Ceylon plants, he (Linnæus) found one bearing the native names of "Dawalkurundu, Nikadawala," under which it is referred to, or described in Herman's "Musæum Zeylanicum." This he considered a species of *Laurus*, apparently from habit alone, and in his usual brief precise style, calls it, "Laurus foliis lanceolatis trinerviis, nervis supra basin unitis;" having previously called the true cinnamon, "Laurus foliis ovato-oblongis trinerviis basi nervos unientibus." The difference between the two, as indicated by the names, seems very slight, merely depending on the one having lanceolate leaves with the nerves united above the base; while in the other the leaves are said to be ovate-oblong with the nerves distinct to the base—differences small indeed, and such as could never be found of much avail in distinguishing the one plant from the other, since they are both constantly met with in different leaves on the same tree. Such being the case, it is not much to be wondered at that botanists should have been surprised by the boldness of Mr. Marshall's announcement, that two trees, believed to be of the same genus, and so nearly alike in their external forms, should yet differ so very widely in their properties. But so it is, and nothing can be more certain, than that the fact is as he states it.

In proceeding to trace the history of the two species, aided

by the light Mr. Marshall has thrown on them, our difficulties vanish like mist before the noon-day sun, though Mr. Marshall himself has found it "difficult to conceive how the Dawalkurundu obtained the appellation of *Laurus Cassia*, from Linnæus." It was because Linnæus's specimen of Dawalkurundu was neither in flower nor in fruit. Had it been so, he was too acute an observer ever to have confounded it with the plants with which he has associated it in his synonyms. This explanation, it may be answered, is mere assumption on my part—it certainly is so, but supported by so strong circumstantial evidence, as not to leave a doubt of its correctness. Linnæus has in his "Flora Zeylanica" given a short description of each of these species: his description of the cinnamon is principally confined to the flower, and is most precise. In his description of the other, the flower is not once alluded to. Here he declares, that he knows not by what mark to distinguish it from the "*camphorifera Japonensium*," which in its foliage it greatly resembles, but nothing can be more distinct than its inflorescence; that of the camphor tree being a panicle, having a stalk as long as the leaves; while in Dawalkurundu it may be described as a subsessile capitulum, that is, 5 or 6 sessile flowers congested on the apex of a very short peduncle, and surrounded by an involucrum of 4 or 5 leaves; several of which capitula usually form verticels round the naked parts of the branches where the leaves have fallen. He begins his description of *Laurus Cassia** by stating that he at first considered it a variety of the antecedent (cinnamon;) but now, that he knows not by what mark to distinguish it from "*camphorifera Japonensium*," for the leaves are thinner than those of cinnamon, the nerves uniting above the base as in *camphorifera*, and are sprinkled beneath with a grayish dew (*subtus rore cæsio*

* "Hanc speciem olim pro antecedentis varietate habui, nunc vero, qua nota hanc a *camphorifera* Japonensium distinguam, non novi: Folia enim *cinnamomo tenuiora*, nervis ante basin coeuntibus ut in *camphorifera;* subtus rore cæsio illinita, ut Camphora, et simul lanceolata ac tenuiori substantia quam præcedentis."—*Linn. Flor. Zeylanica*, p. 62.

illinita) as in the camphor tree, and are at the same time lanceolate and of a thinner texture than the preceding (cinnamon.) The whole of his description, in short, agrees most exactly with Mr. Marshall's description of the Cingalese Dawalkurundu, and leaves not a doubt that both had the same plant in view, and consequently that Mr. Marshall is so far correct in saying that the bark of the *Laurus Cassia* of Linnæus possessed none of the qualities attributed to it. So far all is clear; but now the chapter of errors begins.

Had Linnæus been permitted to exercise his own unbiassed judgment in this case, it is not improbable he would have avoided the error of assigning to a plant which, with all his acuteness, he knew not how to distinguish from the camphor tree, the credit of producing Cassia, or at all events would not have done so without some expression of doubt, so as still to leave the question an open one. But, upon consulting other authorities, he found in Burman's "Thesaurus Zeylanicus" the figure of a species of *Cinnamomum* or *Laurus* as he called the genus, to which Burman had given the name of *Cinnamomum perpetuo florens*, &c., and assigned the native name of Dawalkurundu, not as it appears from the specimen itself having been so named, but because being different from the true cinnamon of which he had seen specimens and figures, he thought it an inferior, wild or jungle sort, which must of necessity be the plant that Herman had described in his "Musæum Zeylanicum," though the inflorescence differed much from the description, (a very essential point, which Burman remarked and endeavors to explain away,) and therefore gave it the same Cingalese name. Linnæus's specimen not being in flower, and the resemblance between the specimen and figure being in other respects considerable, he had not the means of detecting the discrepancy, and unsuspectingly adopted Burman's figure and name as a synonym to his plant. In Rheede's "Hortus Malabaricus," (1 tab. 57) he found the figure of another cinnamon, even more closely resembling his plant in its general aspect than Burman's figure; this he also associated as a synonym; and Rheede's plant be-

ing lauded on account of the aromatic properties of its bark and leaves, which resemble the true cinnamon, though it is not the genuine cinnamon tree, he seems to have considered himself quite safe in associating this also, and called the three species, this tria juncto in uno plant, *Laurus Cassia*, and assigned it as the source of the officinal "*Cassia Lignea Cortex.*"

After this exposition of the origin of the species *Laurus Cassia*, it can scarcely be a matter of surprise that no two botanists have ever agreed as to the plant which ought to bear the name; nor that not one of them should ever have surmised what plant Linnæus had constituted the type of his species. It is not my intention on the present occasion to extend these remarks, by tracing the various conjectures that have been promulgated on the subject; suffice it to say that no one, so far as I am aware, has taken a similar view as that now explained. It only further remains for me to give some account of the three species thus erroneously associated.

The first mentioned, Dawalkurundu, Linnæus's own plant and the type of the species, is, I believe, the *Laurus Involucrata* of Vahl, and of Lamarck in the "Encyclopédie Méthodique," and has in Professor Nees's Monograph of the Indian *Laurinæ* (Wall. Plant. As. rariores,) received the name of *Tetradenia Zeylanica*, but is the *Litsea Zeylanica* of a former work of his, a name which I presume must be restored, owing to the other being preoccupied. The slight difference of structure does not seem to render a new genus necessary.

The second and third have both been referred, by the same eminent botanist, to his variety of the true cinnamon, the *Cinnamomum Zeylanicum*, a decision to which I cannot subscribe, as I cannot perceive that either of these figures are referable to any form of that species, and they besides differ specifically from each other.

The *Cinnamomum perpetuo florens*, appears to me a perfectly distinct species, very nearly allied to, if not actually identical with, Nees's own species *C. sulphuratum*, of which I have now got specimens from Ceylon. This I infer from

the appearance of the plant as represented in the figure, for if any dependence is to be placed on the description, it is impossible to admit it into the genus. On this however, I do not feel disposed to place much reliance, as it was not the practice a century ago, when the description was written, to examine the structure of flowers with the same care that is now bestowed. Should it be objected, that the species I quote as the *C. perpetuo florens* is clothed with yellowish pubescence, which is not mentioned by Burman, then I have another from the same country (Ceylon) perfectly glabrous, agreeing in the form of its leaves, but differing in having more numerous and smaller flowers, which may be substituted, and that I do not think, more than the other, a variety of the genuine cinnamon tree.

The Malabar plant *Carua* (Hort. Mal. 1. tab. 57,) on the other hand, I consider a very passable figure of a plant, in my herbarium named by Nees himself, *Cinnamomum iners;* but, whether or not I am right in the species to which I have referred it, I can have no hesitation in giving it as my opinion that it is not referable to any form of the *C. Zeylanicum;* neither can I agree with him in thinking the plant figured under the name of *Laurus Cassia* in the "Botanical Magazine," No. 1636, is referable to the Ceylon species, but is I think very like the Malabar one, the only species of the genus to which the name *Cassia* should be applied, if that name is still to be retained in botanical nomenclature, as being the only one of the three associated species known to produce that drug. To another plate of the "Botanical Magazine" (*Laurus Cinnamomum*, No. 2028) I also refer here, and feel greatly at a loss to account for its introduction into that work under a different name from the preceding. The plant which Nees formerly considered the *Laurus Cassia*, but now calls *Cinnamomum aromaticum*, from China, is a very nearly allied species, but is distinct, and furnishes much of the bark sold in the European markets under the name of Cassia, though it has nothing whatever to do with the *Laurus Cassia* of Linnæus, which, from the preceding history, appears strictly confin-

ed to Ceylon and India proper, and that name not being referable to any one species, ought unquestionably to be expunged from botanical nomenclature, its longer continuance there only tending to create confusion and uncertainty. This brings me to the next question—namely, what plant or plants yield the Cassia bark of commerce?

The foregoing explanation, in the course of which two plants are referred to as yielding Cassia, greatly simplifies the answer to this one. The first of these is the Malabar Carua figured by Rheede, the second Nee's *Cinnamomum aromaticum*. The list, however, of Cassia-producing plants is not limited to these two, but I firmly believe extends to nearly every species of the genus. A set of specimens, submitted for my examination, of the trees furnishing Cassia on the Malabar Coast, presented no fewer than four distinct species; including among them the genuine cinnamon plant, the bark of the older branches of which, it would appear, is exported from that coast as Cassia. Three or four more species are natives of Ceylon, exclusive of the cinnamon proper, all of which greatly resemble the cinnamon plant, and in the woods might easily be mistaken for it-and peeled; though the produce might be inferior. Thus we have from Western India and Ceylon alone, probably not less than six plants producing Cassia; add to these nearly twice as many more species of *Cinnamomum*, the produce of the more Eastern States of Asia and the Islands of the Eastern Archipelago, all remarkable for their striking family likeness, all I believe endowed with aromatic properties, and probably the greater part, if not the whole, contributing something towards the general result, and we at once see the impossibility of awarding to any one individual species the credit of being the source whence the *Cassia Lignea* of commerce is derived; and equally the impropriety of applying to any one of them the comprehensive specific appellation of Cassia, since all sorts of cinnamon-like plants, yielding bark of a quality unfit to bear the designation of cinnamon in the market, are passed off as Cassia.—*Madras Journal of Literature and Science*, 1839, *No.* 22.

ART. XL.—CORTEX ADSTRINGENS BRASILIENSIS.

From the valuable work of Dr. Dunglison, entitled "New Remedies," we extract the following account of a bark which has the appellation at the head of this article. The name here adopted, however, can only be considered as temporary, as it is exceedingly indefinite, and little comports with the precision of scientific description. The vegetable from which it is derived, being not yet positively determined, the plan of assuming a conventional designation for it, appears to us to have been justifiable, on the ground, that nothing with regard to its origin has been assumed, which, by proving in the course of discovery to be erroneous, would have to undergo correction, and thus lead to subsequent perplexity. This has so often occurred with respect to the source of numerous articles of the vegetable materia medica, that precautionary measures cannot be too much insisted on. If in the course of time the true botanical history of the plant yielding the bark be presented by authority of sufficient respectability, a correct name may be affixed to it, in accordance with settled principles of nomenclature. J. C.

Cortex Adstringens Brasiliensis.

"This bark was introduced into Germany, in the year 1818, by Schimmelbusch, a merchant, who carried it from Brazil, where it had long been used internally as well as externally, as an excellent astringent.* According to Von Martius,† it is the bark of the acacia jurema, but this is not certainly determined.‡ Merrem§ affirms, that the genuine bark is in more or less flat pieces, at times in half, or com-

* Von Schlectendal, in Encyclop. Worterb. der medicin. Wissenschaft. B viii. S. 538. Berlin, 1832.

† Reise, ii. 788.

‡ Riecke, Die neuern Arzneimittel, S. 146.

§ Ueber den Cortex adstringens Brasiliensis. Koln, 1828.

plete rolls, from four to twelve inches long; from an inch to two inches and a half broad, and from one to four lines thick; these are more frequently straight than crooked. The bark may be separated in two parts, an outer, which is rough, and an inner rind of a smooth fibrous character; the two are but loosely connected together. The outer bark is of a grayish brown color, traversed by longitudinal and transverse furrows, having, here and there, white and grayish white crusty growths, covered with a foliated lichen. The inner bark is of a dark red brown on its outer surface, and, after the outer bark has been separated, is somewhat smooth: on the inner side, it is of a brighter reddish brown, and, probably owing to the laceration of the woody splinters, somewhat fibrous. The younger bark is smooth in the fracture, and of a dull splendor. The older bark, which is thicker, is unequal, and may often be separated into fibrous layers, which are readily lacerable. When chewed it has a tolerably strong astringent, somewhat bitter and disagreeable taste, but it does not excite nausea, or leave any *arrière-gout*. It has scarce any smell. In its chemical relations, it resembles the rhatany.*

"*Effects on the Economy.*

"Merrem, who made numerous experiments with this bark, affirms, that whilst it possesses the properties of astringents in general, and to a high degree, it is rather sedative than exciting, agrees with the digestive organs, and aids the peristaltic action. He employed it, first, with more or less success, in hæmorrhage—in epistaxis, hæmoptysis, and menorrhagia; and Günther† found it very efficacious in profuse menstruation arising from atony of the uterus. Secondly; in mucous

* See the analysis by Hofrath Trommsdorff, in Brande's Archiv. B. xxxiii. S. 260; and Dierbach in Heidelberg. Annalen, B. x. H. 3. S. 457. Heidelb. 1834.

† In Harless Rhein-Westphal. Jahrbüchern, B. viii. St. 1, S. 72; and Brande's Archiv. Band xi. S. 200.

discharges, as leucorrhœa, blennorrhœa, &c. Thirdly; in inflammatory and exanthematous affections—as cynanche, urticaria, and in periodical erysipelas of the face. Fourthly; in nervous diseases, especially when combined with disturbance of the menstrual function, and leucorrhœa: and, fifthly; in weakness and catarrhs of the genital organs, bladder, and rectum. The Indians consider, that the bark affects especially the generative apparatus, and from the experiments of Merrem, it would seem, that its agency is more particularly exerted in cases of leucorrhœa; and in many, after the cinchona had been administered without effect.*

"*Mode of Administering.*

"Merrem prescribed it in various forms. He gave the powder in doses of from ℈j. to ʒss. three or four times a day, mixed with water. It appeared to him to act most beneficially in cases of mucous discharges unaccompanied by disorder of the digestive functions; and he found that the powder was better borne by some than the decoction, which is somewhat singular, as the woody matter is more apt, in such cases, to disagree. He rarely gave it combined with aromatics, and never found the combination of use. To form the decoction, an ounce of the coarsely powdered bark was boiled with sixteen ounces of water, down to ʒviij.; and to this an ounce of syrup was added. The dose was from one to two spoonfuls every two hours. Merrem also prepared an extract, and a tincture, in the same manner as these preparations are made of the cinchona; of the former he took from one to two drachms, dissolved it in six ounces of an aromatic water, and added ʒss. of syrup. Of the mixture, a spoonful was given every hour.

"Externally, the decoction was injected three times a day in leucorrhœa, and in blennorrhœa; or, in the former disease a sponge imbued with the decoction, was introduced, and kept there for some time. It has been applied, also, as an astringent to ulcers.

* Osann, in Encyc. Wörterbuch der medicin. Wissensch. viii. 541.

Mistura Corticis Brasiliensis Adstringentis.

Mixture of the Astringent Bark of Brazil.

℞. Decoct. cort. adstring. Brazil. ℥vij.
Copaib. cum vitelli ovi q. s. subact.
Tinct. ferri pomati aa. ℥ij.
Syrup. balsam. ℥j. M.

Dose.—A spoonful every two hours, in obstinate gonorrhœa and leucorrhœa. MERREM.

℞. Cort. adstring. Brasil. ℥ss.
Coque cum aquæ fontan. q. s.
Sub fin. coction. adde
Herb. sabin. ℥ss.
Colaturæ, ℥viij. adde
Syrup. cort. aurant. ℥j.

Dose.—A spoonful every hour, in cancer of the uterus, and in the hæmorrhage thence arising. MERREM.

ART. XLI.—FORMULÆ FOR THE EMPLOYMENT OF THE LACTATE OF IRON. By P. A. Cap.

The Lactate of Iron, which the researches of MM. Gelis and Conte, and by the report of M. Bouillaud, has been introduced into therapeutics, has commenced to be frequently demanded in the shops. It will therefore be advantageous to fix upon some officinal formulæ, which will permit practitioners to calculate easily the quantity of the salt employed under different pharmaceutic forms. The following are what I propose:

Pastils of Lactate of Iron.

℞. Lactate of iron, 30 grammes.
Sugar, 360 "
Mucilage of gum arab. q. s.

Mould into lozenges, weighing 65 centigrammes, each of which will contain 5 centigrammes of the salt.

Syrup of Lactate of Iron.

℞. Lactate of Iron, 4 grammes.
Boiling distilled water, 200 "
White sugar, 400 "

The lactate of iron not being soluble but in 40 parts of boiling distilled water, a greater quantity can hardly be introduced into a syrup. This proportion is a 150th, (about 4 grains per ounce.) The method which has best succeeded with me is the following:

Triturate the salt with four times its weight of pulverized sugar, dissolve it rapidly in the whole of the distilled water, and pour the whole into a matras, which is to be placed in a salt bath, after having added the remainder of the sugar, broken into small fragments; as soon as the sugar is dissolved, pour the syrup on a filter; and when it has cooled, preserve it in well stopped bottles. This syrup has a light amber tint

and keeps exceedingly well. I believe that its employment is more convenient than that of the pastils, because its ferruginous taste does not remain so long a time in the mouth.

Pills of Lactate of Iron.

℞. Lactate of Iron.
Powdered marshmallows, 1 gramme.
Honey, q. s.

Make 20 pills, which should be silvered immediately, or covered with gelatine according to the method of M. Garot.

I give this formula, which can be modified in the doses, only to inform practitioners that it would be improper to bring in contact with the lactate of iron, astringent extracts, or others capable of decomposing it.

Journ. de Pharmacie.

ART. XLII.—NOTE UPON DIFFERENT FALSIFICATIONS OF THE LACTATE OF IRON. By M. Louradour.

In the March number of the Journal de Pharmacie,* I have described the method adopted by me for the preparation of crystallized lactate of iron. Since that period, having had occasion to examine different specimens of lactate of iron, I have detected several adulterations practised by aid of the pulverulent form, under which manufacturers have believed they ought to introduce it into the market, and I hasten to make them known to my associates.

I have found, in fact, in some of these specimens, effloresced sulphate of iron, or the same precipitated with alcohol; in others, starch or sugar of milk.

Nothing is easier than to determine the first of these adul-

*See last number of this Journal.

terations by means of nitrate of baryta, which precipitates all the sulphuric acid from the sulphate. For the second, the tincture of iodine affords a sensible reagent.

The third is less easy of detection, the sugar of milk and lactate of iron being equally soluble in water, and insoluble in alcohol or ether. We can succeed, however, by means of nitric acid, which transforms the sugar of milk into mucic acid. Heat about 2 grammes of the suspected article with 30 grammes of nitric acid, until the whole shall be reduced to 6 or 7 grammes. If the salt be pure, the liquid will remain clear after cooling. Should the salt contain lactine, it will form a white pulverulent precipitate of mucic acid, of which the characters can be easily recognised.

It is possible, doubtless, to avoid these falsifications, by testing the pulverized lactate of iron before employing it, but it is simpler and surer not to admit the salt, except under the form of crystalline plates, which with difficulty permit of fraud.

Journal de Pharmacie.

ART. XLIII.—UPON THE FORMATION OF LACTIC ACID, EXTRACTED FROM A NOTE COMMUNICATED TO THE SOCIETÉ PHILOMATIQUE. By MM. Fremy, and Boutron Charlard.

These two chemists have been enabled to determine with precision the circumstances and the agent which form lactic acid. All animal matters which act as ordinary ferments, may at length undergo a modification, which causes them to assume a new and more energetic power. They acquire in fact the property of transforming into lactic acid, not only sugar, but in addition dextrine, gum, amidon, &c.; at the same time their action is paralyzed at a temperature of 100°. MM. Fremy and Boutron, hope that the investigation of these phenomena, will permit them to explain the formation of acids in vegetation; it has led them to discover the following method of preparing lactic acid.

Independently of diastase, malt contains a sufficient quantity of animal matter to produce the formation of lactic acid, when it becomes modified.

To obtain this result, malt slightly moistened is enclosed in stopped flasks and kept in them for three or four days. During this interval, the animal matter contained in the barley, becomes modified, the temperature is elevated; and if barley, thus modified, is kept in water at 40°, this water becomes strongly acid, and is charged with considerable quantities of lactic acid. It appears evident to MM. Fremy, and Boutron, that in this case the diastase transforms the amidon into dextrine and sugar, which is changed into lactic acid under the influence of the animal matter.

Journ. de Pharmacie.

ART. XLIV.—NOTE UPON TANNIN.

By M. Beral.

Liquid tannin, that is to say, that which is obtained directly from nut galls by hydrated sulphuric ether, is different from solid tannin. The latter is a pure immediate principle, the other is composed of tannin, water, and sulphuric ether, in proportions not correctly determined, but which I believe to be constant; or at most, susceptible of slight variations. The following facts permit us, at least in my opinion, to adopt the following conclusions.

1st. Liquid tannin is very little soluble in water saturated with sulphuric ether, yet when tannin is added to hydrate of ether it is soluble to a marked degree.

2. When the watery solution of nut galls is saturated with sulphuric ether, the tannin contained in it is transformed into liquid tannin, and this is separated from the remainder of the liquid.

3. Tannin dissolved in water is affected in the same way, when ether is mixed with it. By standing, the mixture is separated into three strata, the first, or that at the bottom, is liquid tannin, the second is etherealized water, and the third is ether. This experiment succeeds best when the solution is concentrated.

The property recognised in tannin of being little soluble in hydrate of ether is interesting, as it led me to suspect the possibility of extracting from the diluted tincture of nut galls, a part of the tannin which it contains, an extraction which, up to this time, had been considered as impossible. In fact, in the memoir upon tannin published by M. Pelouze in the Annals de Chimie et de Physique, we read the following: "Tannin is one of the most easily altered substances known, and it is besides accompanied in vegetables with coloring matters, of which it is extremely difficult, perhaps impossible, to free it completely, when the solution is at the same time effected."

Aqueous solution of nut galls and extraction of the tannin which it contains.

℞. Nut galls in fine powder, 4 oz.
Distilled water, 8 "

Mix. After two hours, pour the mixture upon a paper filter placed in a funnel. Place under it a vessel to receive the liquid which filters through, and when it has ceased to run, add two ounces of sulphuric ether to the solution obtained, the quantity of which will be about four ounces. Shake the mixture for a few minutes; pour it into a funnel with a stop cock. After standing a few moments, the liquid tannin which forms, will occupy the lower portion of the vessel. Separate it, and repeat the operation until no more liquid tannin is formed. Dry what has been obtained by the heat of a stove, carried to 100° C.

By this method the whole of the tannin contained in the solution of nut galls cannot be obtained. About two-thirds remain in solution, a fact which depends upon some circumstance to be determined.

Theory of the extraction of Tannin by ether.

M. Pelouze, in the memoir cited, thus expresses himself upon the subject of the extraction of tannin.

"Of all the substances which constitute nut galls, that which is most soluble in water, and which has the greatest affinity for this liquid, is tannin.

"When, therefore, nut galls in fine powder are brought in contact with ether containing water, the tannin seizes upon the water contained in the ether, forms with it and a certain quantity of ether a very dense syrup, which by degrees is pushed from the filter into the decanter by the upper layers of ether, which in this case perform the office of a piston. A remarkable fact, which equally explains itself; the liquids are scarcely colored, while if the residue of the nut galls be treated with distilled water, there is extracted a reddish-brown

liquid, which contains in solution the coloring matters of these same nut galls."

This theory is based essentially, as is seen, upon the presumption that the tannin is much more soluble in water, than the coloring matter of the nut galls, and subsidiary upon these two facts, viz.: that the tannin is the predominant principle of nut galls, and that it is always in excess with reference to the quantity of water with which it is brought in contact.

I am persuaded that this is not the case, and that the separation of the tannin from the other principles which is so exact and so complete, is solely due to the property possessed by this substance of combining with determined quantities of water and ether. In fact, by refusing to admit this new theory, we will be reduced to the necessity of saying, that we cannot separate the tannin from the aqueous solution of nut galls, but when this body is less soluble in water than the coloring matter. The elimination of the tannin is certainly not due any longer to the preponderance of this same tannin, for we know that the hydrated ether abstracts from nut galls the least proportion of tannin that it contains, and at this point of the operation it is very evident that the coloring matter predominates.

Liquid tannin is approximatively formed of

Tannin,	40
Water,	7
Sulphuric ether,	53
Total,	100 parts.

Shaken with a mixture of ether and water, the tannin produces a liquid, the composition of which is analogous to the above, although the tannin should be in contact with an excess of ether and water.

The ingenious method of M. Pelouze to obtain tannin is certainly the best, relatively to the purity of the product, but it leaves much to be desired in am nyrespects.

It is certain, that in hands skilled in this work, the execution of the process which occupies us is easy, but it isnot less true, that in other hands it is always variable, and the quantity of tannin obtained is different according to the nature of the ether employed.

The method of M. Le Connet furnishes more tannin with less expense; but the execution is little convenient and the product less pure.

I have searched, but uselessly, for a method, by the aid of which it was possible to extract from nut galls, with facility and certainty in the results, 46 or 50 per cent. of tannin, sufficiently pure for the uses of medicine.

I have submitted nut galls to many modes of treatment, yet I shall content myself with stating but one of them.

Extraction of Tannin by hydro-alcoholic sulphuric ether.

℞.	Rectified sulphuric ether,	12 oz.
	Alcohol at 30° Cartier,	3 "
	Distilled water,	1 "
	Total,	16 oz.
	Nut galls in fine powder,	8 "

Suspend the powder in half of the ethereal liquid, place the mixture in a funnel with a stopcock, pour upon it the remainder of the solvent, and after six hours contact open the cock and collect the fluid which runs off, taking care at the same time to add 4 or 5 ounces of water, in order to displace the ether retained by the powder. You obtain a yellow solution, about 12 or 13 ounces in weight, and which will furnish by proper evaporation near 4 ounces of tannin. Thus obtained, the tannin has a pale yellow color, due to a small quantity of coloring matter ; it can become of use in the arts.

Journ. de Chim. Med.

ART. XLV.—SULPHURIC ACID CONTAINING ARSENIC.

In the Repertory of Pharmacy of Buchner, M. Wackroder,* has drawn the attention of chemists to an acid called English sulphuric acid, but which is probably from Bohemia, and is actually to be extensively found in commerce. This acid contains, besides sulphate of lead, considerable arsenic acid. It is likewise announced that this article cannot be used as the means of obtaining pure hydrochloric or rectified sulphuric acid; and in consequence of the alteration produced in these acids by the arsenic contained in it, it should be rejected in their preparation. It has since been noticed, that it will not answer in the preparation of pure nitric acid, and sulphate of zinc, in the disengagement of hydrogen gas, or in general for any chemico-pharmaceutical agent.

New trials have confirmed him in the truth of these opinions; they have demonstrated to him the frequent alterations produced in phosphorus by the presence of arsenic. The facts communicated by MM. Barweld and Wittstork, (*Jarbuche für die Pharmacie,*) came under his notice during his researches. According to the experiments of this chemist, he used, together with M. Muller, a sulphuric acid containing arsenic, and was not able to obtain from bones phosphoric acid exempt from arsenic, even when this phosphoric acid was purified by means of alcohol. On saturating this acid by carbonate of soda, all the arsenic passed to the soda and remained in combination with it, principally in the last crystals obtained from the solution. Phosphates free from arsenic cannot be formed with such an acid, except it be previously purified by sulphuretted hydrogen. An examination of the phosphate of soda of commerce, appears to us very necessary, as in many shops a phosphate has been found which was rendered impure by the presence of arsenic. Likewise the chemists of Berlin have found arsenic in phosphorus. Phosphoric acid prepared from phosphorus, by nitric acid, will always contain

* Journ. für Pract. Chemie.

arsenic, although a portion may be reduced during evaporation, by the agency of the phosphorous and nitrous acids, but principally by the phosphuretted hydrogen which is developed. It results from this that a perfect purification of this acid cannot take place without the agency of sulphuretted hydrogen. I may add, that I have never detected arsenic in the water in which phosphorus has been kept.

But, if sulphuric acid containing arsenic is pernicious in pharmaceutical preparations, it should also be in the extraction of tartaric acid. In fact we have found arsenic in the liquor from which tartaric acid has been separated by crystallization. Nevertheless, we have never detected arsenic in the tartaric acid of commerce, which is generally in large and handsome crystals, although it may have contained lead. All these facts prove that too much attention cannot be paid to the chemico-pharmaceutical products as they exist in commerce.

In a report made to the Royal Academy of Medicine, we have made known the fact that the sulphuric acid prepared at Lyons from pyrites contains arsenic.

Journ. de Chim. Med.

ART. XLVI.—NEW TEST LIQUOR FOR ACIDS AND ALKALIES. By J. Marsh.

The infusion of the common red cabbage has been long in use in the chemical laboratory, as a test to distinguish acid from alkaline bodies when in solution; and although possessed of great delicacy in this respect, is still subject to an objection, on account of its becoming so exceedingly offensive in its smell, after having been prepared a few months.

In order to obviate this objection, I undertook some experiments, about two years ago, on the coloring matter of the dark red hollyhock, the purple radish, and the dark red beet root; but during my experiments, I found many objections to all. The beautiful blue color of the dark red hollyhock, obtained by alcohol, is, however, worthy of notice; but I have not had time to look much to it during my experiments on this subject, my attention being forcibly drawn to the beautifully colored infusion obtained from the dark varieties of the dahlia, such as the Conqueror of Sussex, Sir Edward Codrington, Sir E. Sugden, Alman's Splendissima, Parson's Rival, Brown's Ion, Holme's Rival, Sussex Lima, Metropolitan Perfection, Pasha of Egypt, Robert le Diable, and Sambo,—these being the varieties that I have mostly employed; there are many more equally good, but they have not fallen in my way.

This infusion is easily obtained as follows:—Into an infusion pot, or any common earthen vessel, let as many of the petals of the above named dahlias be lightly pressed, and then boiling hot distilled, or good rain water, sufficient to cover the petals about an inch, be introduced. The best method of keeping them down, is by means of a piece of plate glass or the foot of a broken tumbler, or even a piece of common porcelain will do very well. The whole may be kept on the hob of a common fire place, simmering for two or three hours, covered over with a piece of common paper, to keep out any dirt which might otherwise fall in. The liquor is then to be

poured off the petals, which will be found almost colorless. To every pint of the solution add half an ounce of sulphuric acid, keeping the whole slowly stirred with a slip of glass. When quite cold, add to every pint of the mixture two grains of corrosive sublimate, dissolved in a portion of the liquor: filter the whole through a piece of coarse cloth, and bottle it up; and it will be immediately fit for use.

When wanted for use, the liquor is to be carefully neutralized by ammonia, which gives it a dim olive color, and in this state it may be used liquid; or bibulous paper may be dipped in it, and then dried. Either the liquor or paper will become green with alkalies and red with acids.

Being desirous of turning to account some of the qualities of this class of flowers now so much cultivated and so generally admired, and also of rendering them useful as well as ornamental, I have made several attempts to fix it as a dye stuff on cloths, &c., but have not yet succeeded in my attempts to my own satisfaction.

The great abundance of these flowers, and the ease with which they can be obtained, (as they answer every purpose after having been exhibited) together with the simple method of obtaining this test liquor, will, I hope, be thought worthy of the attention of the Society of Arts. In conclusion, I beg to add, it has been approved of and adopted at the Royal Military Academy and Royal Institution; and any further information that the Society may require in regard to this subject, I shall feel much real pleasure in communicating when the the Society may honor me with their commands.

Trans. Soc. Arts, Manuf. and Com.

ART. XLVII.—FREE HYPOSULPHUROUS ACID. By M. Langlois, Professor of Chemistry in the Military Hospital of Instruction, of Strasbourg.

M. Herschel and M. Gay Lussac have in vain attempted to isolate hyposulphuric acid from hyposulphate of strontian; the former employing sulphuric acid, the latter an alcoholic solution of hydrochloric acids. M. Langlois has succeeded in decomposing the hyposulphite of potassa, by means of perchloric acid, added by degrees to a cold solution of this salt. He separated by the filter the perchlorate of potassa, and concentrating the liquid in vacuo, obtained the hyposulphurous acid, as a colorless liquid, of a syrupy consistence, and of a strongly acid and bitter taste. At the temperature of 80°c. this acid is decomposed, producing sulphurous acid gas and a deposit of sulphur. It does not affect the salts of lime, strontian, iron, zinc, and copper, but it precipitates the salts of lead, silver, mercury, and platinum. Nitric and chloric acids immediately decompose it.

Comptes rendes a l'Institut, and Journ de Pharm.

ART. XLVIII.—EXAMINATION OF FALSE AND TRUE ANGUSTURA BARK. By M. Genest, Jr., of Angers.

Not finding in authors who have written upon this subject, well defined discriminating chemical characters of the two kinds of angustura, I have repeated the experiments, which I have found detailed in books, and at the same time I have undertaken a series of new researches, with the view of fixing upon some prominent points of difference. Although I may not flatter myself that I have attained the end in view, yet all that relates to the discrimination between these two barks is of so much interest to pharmaceutists, that I think I ought to report the results, which are different from those previously stated, and which I suppose peculiar to myself, as well as the new reactions exhibited by the experiments made with the above intention.

A drachm of the powder of each kind, was allowed to macerate in an ounce and a half of distilled water; the supernatent liquid when filtered presented the following phenomena:

	True.	*False.*
Chloride of Barium,	No precipitate.	Much cloudiness; then a precipitate, which did not entirely dissolve in nitric acid.
Bichloride of Mercury,	The reaction resembles that indicated in the books.	Abundant dull white precipitate.
Tartar Emetic,	Same observation.	In place of a white precipitate, I obtained but a slight cloudiness.
Perchloride of Iron, This reagent appeared to me to present a greater difference than the sulphate of the same base.	A very abundant reddish brown precipitate.	Dull green.
Sulphuric Acid,	It did not render the true very cloudy, as it is said it ought to do. I obtained but a slight cloudiness.	

Decoction.

I boiled for ten minutes the same quantity of both kinds in the same amount of water. I remarked that the powder of the true became more voluminous than that of the false. Its decoction was filtered with greater difficulty.

When preserved for several days, the preparation of the true, preserved its color and transparency, whilst the other stained the sides of the glass and assumed a blackish-brown color.

	True.	*False.*
Chloride of Barium,	Nothing.	Cloudy.
Nitrate of Silver,	Abundant yellow precipitate.	Nothing.
Sulphuric Acid,	Yellow precipitate.	Nothing.
Perchloride of Iron,	Gray precipitate.	Deep green coloration, without precipitate.
Caustic Potassa,	Reddish yellow coloration by refraction, and dull green by reflection.	Greenish tint, the liquid remaining transparent.
Phosphate of Soda,	Nothing.	Nothing immediately—then deep brown coloration.

Journ. de Chimie Medicale.

ART. XLIX.—ON CERTAIN FACTS RELATIVE TO THE OXIDES OF SULPHUR By M. Persoz.

In a thesis, sustained seven years since before the Faculty of the Sciences of Paris, M. Persoz said that certain compounds, and especially sulphuric acid, were comparable to cyanogen, and might like it exercise the functions of simple bodies in uniting with oxygen, sulphur, chlorine, bromine or iodine; under this view, sulphuric acid cannot be considered as a compound of sulphur and oxygen, but rather as composed of two volumes of sulphurous acid, and one of oxygen, and he was naturally induced to place the sulphurous acid, as a new radical, in contact, successively with different simple bodies, with which it might unite to produce compounds analogous to the binary combinations of simple bodies. M. Persoz had applied himself to the study of these combinations when the publication of M. Langlois on hyposulphurous acid constrained him prematurely to make known the results which he had obtained.

M. Vauquelin, by acting with 8 grammes of sulphur, upon 10 grammes of carbonate of potassa, and ascertaining the sulphur in each product, which he procured, could find only 7.183 grammes. This singular observation having caused M. Persoz to suspect that Vauquelin had been led into error by the formation of an unknown compound, he repeated the experiments, by fusing at a red heat, 80 gr. of sulphur with 100 gr. of carbonate of potassa, dry and pure. The matter, when cold, pulverized and subjected to alcohol of 40° left a pulverulent residuum, analogous in appearance to sulphate of potassa. He examined the residuum, and found that when heated in a small tube, it gave off sulphur, and that treated with nitric acid, at a moderate temperature, it decomposed this acid and deposited sulphur; he recognised at last that this salt was formed by hyposulphurous acid, and according to his system he denominated it sulpho-sulphuric

acid, $\ddot{S}+S$, and of which many of the properties confound it with its analogous oxy-sulphuric acid, $\ddot{S}+O$.

M. Persoz succeeded in isolating the sulpho-sulphuric acid, by decomposing the sulpho-sulphate of lead by sulphuretted hydrogen. He filtered the liquor, and evaporated in vacuo, or on a stove in flat bottomed capsules, and thus obtained an acid, colorless, very dense, and decomposable by heat into sulphurous acid and sulphur. The sulpho-sulphuric acid decomposes in the cold the carbonates of soda, potassa, lime, magnesia and lead, it unites directly with bases, and form salts, which are to the oxy-sulphates as the seleniates are to the sulphates, or arseniates are to the phosphates.

In contact with simple bodies, or compounds which have a direct action on sulphur or on sulphurous acid, the sulpho-sulphuric acid is always destroyed. Either in the cold or with the aid of an elevated temperature, it decomposes the salts formed with acids or bases of easy reduction. We can easily designate its properties and those of the sulpho-sulphates, and forsee the phenomena to which it should give rise, by considering its analogy with the oxy-sulphuric acid and the properties of its elements, sulphurous acid and sulphur.

Journ de Pharm.

ART. L.—ON SALSEPARINE.

By M. Beral.

Many pharmaceutists, among whom it is proper to cite Thubeuf, have been engaged upon salseparine. After having pointed out different methods by which this substance can be obtained, they have informed us of its chemical properties and elementary analysis.

Having devoted myself to researches with the view of determining the best method in practice for the preparation of the essence of sarsaparilla, I became assured (several years ago) that sarsaparilla, when treated with cold water, furnished a more sapid medicine, than that which results from the prolonged action of boiling water, upon the same substance. It was in consideration of this fact, that I proposed to substitute maceration for decoction, the practice of which had become almost universal. At that period I was convinced that the application of this mode of treatment for the extraction of the medicinal principles of sarsaparilla would secure great advantages for therapeutics. A great number of medical observations have since fully justified my anticipations upon this subject. It is known that many physicians have obtained effects, by the use of sarsaparilla, which have been called in question by numerous other practitioners. Such opposing experience without doubt depends upon the fact, that the first had made use of preparations of sarsaparilla prepared without heat, or at a moderate temperature, and that the others had employed such as were made by an opposite plan. In pursuing my researches upon sarsaparilla, I have ascertained that this substance contains a volatile principle, and I have been sufficiently fortunate as to be able to isolate it. Having been examined with care, this principle has been found to be pure salseparine.

This fact, which has escaped the researches of our predecessors, and which I believe to be of some importance in medicine, explains every thing, and proves, in a satisfactory manner,

that heat employed for the extraction of the active parts of sarsaparilla should be banished from practice. Salseparine, possessing great medical power, every thing concurs to lead us to presume that to its presence sarsaparilla owes the properties which have given to it so exalted a reputation in the healing art.

It can be imagined, that in consequence of the volatility of salseparine the preparations of sarsaparilla which have been submitted to the action of heat are entirely deprived of this principle. I am certain, on the contrary, that the extract obtained by the concentration of the alcoholic tincture, by aid of the salt water bath, still contains a considerable quantity of it.

I have obtained salseparine, by distilling in a salt water bath a tincture of sarsaparilla, prepared with very dilute alcohol, and filtering the product after it has stood several hours.

Journ. de Chimie Medicale.

ART. LI.—ON THE PREPARATION OF SANTONINE.

By M. A. Guillemette.

Having latterly had occasion to prepare santonine for use in pharmacy, I had recourse to the processes of MM. Koehler and Merck. The former treats the semen-contra by sulphuric ether, and distils off the ether to obtain crystals; these are purified by solution in alcohol to which a little hydrochloric acid has been added. The latter consists in submitting the seed to the action of slacked lime and alcohol, and distilling the tincture to one-fourth, filtering to separate the resin, then treating with heat the alcoholic extract by concentrated acetic acid, which upon cooling deposits the santonine in crystals. After frequent solution in alcohol mixed with charcoal, and crystallization, it is obtained in a pure state.

These processes succeed sufficiently well in extracting nearly all the santonine from the semen-contra; but they appear to me to be too expensive.

Many German physicians having recognized in this substance well marked vermifuge properties, in the dose of thirty or forty centigrammes, I have thought that it would not be without interest to make known a process by which it might be obtained more readily and at less cost, and put it in the power of physicians to judge of its medicinal properties. In detailing these observations upon that species of stearoptene, I am desirous of seeing it some day enriching the portion of the materia medica used in infantile cases, as its nature permits it to be administered with facility.

The chemical properties of this substance are very remarkable, and have been well investigated by the chemists to whom we are indebted for our knowledge of its existence. It presents itself as brilliant crystals, under the form of elongated quadrilateral tables; it is insoluble in water, but soluble in alcohol and ether; its solutions have a bitter taste. It is neither alkaline or acid, nevertheless, it combines strongly with bases, and forms with lime, baryta, and oxide of lead, crystallizable

salts. When a mixture of santonine, lime, water and alcohol, is heated it becomes red; and upon cooling, deposits crystals in the form of red silky needles, which spontaneously become white, by decrease of temperature losing their color. I availed myself of the facility with which I have succeeded in obtaining this substance, to re-investigate its properties. If my experiments should afford any result, I shall have the honor of submitting them to the Society of Pharmacy.

The following is the process which has afforded me the best results: 2000 grammes of semen-contra of Aleppo were reduced to a fine powder and moistened with sufficient cold water to form it into a soft paste, and after macerating for six hours was subjected to pressure. The cake being pulverized, was again macerated, and expressed eighteen hours after. The mass having been dried and pulverized, was placed in contact with alcohol of 89° c. and then, after a maceration of twenty-four hours, expressed. This process was repeated until the mass was exhausted.

The alcoholic solutions were united and filtered, then distilled on a salt water bath, to about 350 grammes. This tincture, set aside in a capsule, soon deposited in crystals all the santonine which it contained. Part adheres to the vessel, the rest remains mixed with resin, volatile oil, and chlorophylle. It is separated from these by decantation, and pressing the crystals between folds of muslin. They are then purified by boiling alcohol and charcoal. Two crystallizations were sufficient to obtain it pure, and similiar to the specimen which I now have the honor to submit.

A kilogramme of seed yields me nearly four gros of santonine. *Journ. de Pharm.*

ART. LII.—MODE OF DETECTING THE ADULTERATION OF ESSENTIAL OIL WITH ALCOHOL, BY MEANS OF CHLORIDE OF CALCIUM. By M. Borsarelli.

The author provides himself with a small cylindrical tube about three centimetres in diameter, and twelve in length, closed at one extremity. He fills this two-thirds full of the essential oil, and introduces small pieces of chloride of calcium, perfectly dry, and totally free from dust; the opening of the tube is then closed, and heat applied for four or five minutes, by means of a salt water bath, of the temperature of 100°, taking care to shake the mixture occasionally, and then allowing it to cool slowly.

If the essential oil contains a notable proportion of alcohol, the chloride dissolves entirely, and forms a stratum of liquid which occupies the inferior portion of the tube, while the essential oil rises above. When the essential oil contains but a very small proportion of alcohol, the pieces of chloride of calcium, lose their form and reunite at the bottom into a white adherent mass. Finally, when the oil is perfectly pure, the fragments of chloride do not undergo any change even in shape.

It is proper to add, that when we wish to test any essential oil, we should employ the chloride of calcium, in very feeble quantities at first, and afterwards to add gradually the new fractions, lest if the proportion of alcohol be very small, it should not be absorbed by the chloride without sensibly changing it, or without its presence being recognised. In every case it is easy to determine the proportions of a mixture of alcohol and essential oil, by comparing its volume or weight with the volume or weight of the essential oil which floats upon the surface of the alcoholic solution of the chloride, when the operation is finished.

The author adds, that the same process may be employed to detect the quantity of alcohol which ether may contain, by using a longer tube and taking care not to close it very exactly.

Rev. Scien. et Indust. and Journ. de Pharm.

ART. LIII.—THE ACTIVE PRINCIPLE OF THE BARK OF THE ROOT OF THE ELDER (SAMBUCUS NIGER.) By E. Simon, Pharmaceutist at Berlin.

M. Simon concludes from his researches upon this substance, that its active principle is a soft resin, and that it does not contain a crystallizable matter. The bark of the root dried at 20° R. was reduced to powder and treated by several portions of alcohol of 0.825 until it ceased to dissolve anything; these tinctures were filtered and distilled on a salt water bath; to withdraw the alcohol the resulting syrupy mass was mixed with ether, which separated a hard resin, of but little activity, and the liquid was evaporated to a thick extract. Twenty grains of this extact were sufficient to produce four or five vomitings, and as many stools.

Ann. der Pharm. and Journ. de Pharm.

ART. LIV.—ON THE CULTIVATION OF ROSES AND THE MANUFACTURE OF ROSE WATER AND UTUR AT GHAZEEPORE.

We are indebted to Dr. Jackson, Civil Surgeon at Ghazeepore, for the subjoined very interesting note on the celebrated Rose trade of that district. The information was sought for, for a work now in progress on "Indian Materia Medica;" meanwhile we have much pleasure in giving publicity in this Journal to the curious facts Dr. Jackson has collected.

Journal of the Asiatic Society of Bengal, of May, 1839

I have now the pleasure of sending you the information you require on the manufacture and trade of Rose-water in this district. Ghazeepore seems to have been long famed

for its Attar and Rose-water, and having got the name, it has done its best to preserve it. The cultivation of the Rose plant is sufficient to supply the demand, and as the average remuneration is not more than enough to compensate for the trouble of its culture, no competition from the adjoining districts has been made.

Around the station of Ghazeepore there are about 300 beegahs, or about 150 acres, of ground laid out in small detached fields as Rose gardens, most carefully protected on all sides by high mud walls and prickly pear fences, to keep out the cattle. These lands, which belong to Zemindars, are planted with Rose trees, and are annually let out at so much per beegah for the ground, and so much additional for the Rose plants—generally five rupees per beegah, and twenty-five rupees for the Rose trees, of which there are 1000 in each beegah. The additional expense for cultivation would be about 8|8; so that for rupees 30|8 you have for the season one beegah of 1000 Rose trees.

If the season is good, this beegah of 1000 Rose trees should yield one lac of Roses. Purchases for Roses are always made at so much per lac. The price of course varies according to the year, and will average from 40 to 70 rupees. During the past season the latter was the price given for one lac of Roses towards the conclusion.

As soon as the Roses come into flower, the Zemindars and cultivators of the Rose gardens, as well as intending purchasers, meet in the city, and according to the demand and expected produce, a *nerick* is established, and purchasers then enter into agreement with the cultivators for so many lacs of Roses at such a price. This agreement is considered binding, and the cultivator is obliged to deliver the quantity at the contract rate; when that is completed another can be made, but this latter is always at a much higher rate.

The Rose trees come into flower at the beginning of March and continue so through April. In the morning early the flowers are plucked by numbers of men, women, and children, and are conveyed in large bags to the several contracting

parties for distillation. The cultivators themselves very rarely manufacture.

The native apparatus for distilling the Rose-water is of the simplest construction ; it consists of a large copper or iron boiler well tinned, capable of holding from eight to twelve gallons, (shaped like the earthen hoondahs in which the Gomastahs send in their Opium) having a large body with a rather narrow neck, and a mouth about eight inches in diameter; on the top of this is fixed the head of the still, which is nothing more than an old *dekchee*, or cooking vessel, with a hole in the centre to receive the tube or worm.

This tube is composed of two pieces of bamboo, fastened at an acute angle, and it is covered the whole length with a strong binding of corded string, over which is a luting of earth to prevent the vapor from escaping. The small end, about two feet long, is fixed into the hole in the centre of the head, where it is well luted with flour and water. The lower arm or end of the tube is carried down into a long necked vessel or receiver, called a *bhubka*. This is placed in a handee of water, which as it gets hot is changed. The head of the still is luted on to the body, and the long arm of the tube in the *bhubka* is also well provided with a cushion of cloth, so as to keep in all vapor. The boiler is let into an earthen furnace, and the whole is ready for operation.

There is such a variety of Rose-water manufactured in the bazar, and so much that bears the name, which is nothing more than a mixture of sandal oil, that it is impossible to lay down the plan which is adopted. The best Rose-water however in the bazar may be computed as bearing the proportion of one thousand Roses to a seer of water ; this perhaps may be considered as the best procurable. From one thousand Roses most generally a seer and a half of Rose-water is distilled, and perhaps from this even the Attar has been removed.

The boiler of the still will hold from eight to twelve or sixteen thousand Roses. On eight thousand Roses from ten to eleven seers of water will be placed, and eight seers of Rose-water will be distilled. This after distillation is placed

in a carboy of glass, and is exposed to the sun for several days to become *puckah;* it is then stopped with cotton, and has a covering of moist clay put over it; this becoming hard effectually prevents the scent from escaping. The price of this will be from twelve to sixteen rupees. This is the best that can be procured.

To procure the Attar, the Roses are put into the still, and the water passes over gradually as in the Rose-water process; after the whole has come over, the Rose-water is placed in a large metal basin, which is covered with wetted muslin tied over to prevent insects or dust getting into it; this vessel is let into the ground about two feet, which has been previously wetted with water, and it is allowed to remain quiet during the whole night. The Attar is always made at the beginning of the season when the nights are cool; in the morning early the little film of Attar, which is formed upon the surface of the Rose-water during the night, is removed by means of a feather, and it is then carefully placed in a small phial; and day after day as the collection is made it is placed for a short period in the sun, and after a sufficient quantity has been procured it is poured off clear, and of the color of amber, into small phials. Pure Attar, when it has been removed only three or four days has a pale greenish hue; by keeping, it loses this, and in a few weeks time it becomes of a pale yellow. The first few days' distillation does not produce such fine Attar as comes off afterwards, in consequence of the dust or little particles of dirt in the still and the tube being mixed with it. This is readily separated, from its sinking to the bottom of the Attar, which melts at a temperature of 84°. From one lac of Roses it is generally calculated that 180 grains, or one tolah, of Attar can be procured; more than this can be obtained if the Roses are full sized, and the nights cold to allow of the congelation. The Attar purchased in the bazar is generally adulterated, mixed with sandal oil or sweet oil; not even the richest native will give the price at which the purest Attar alone can be obtained, and the purest Attar that is made is sold only to Europeans. During the past year it has been selling from

80 to 90 rupees the tolah ; the year before it might have been purchased for 50 rupees. Native stills are let out at so much per day or week, and it frequently occurs that the residents prepare some Rose-water for their own use as a present to their friends, to secure their being provided with that which is the best. The natives never remove the calices of the Rose flowers, but place the whole in the still as it comes from the gardens.

The best plan appears to me to have this removed, as by this means the Rose-water may be preserved a longer time, and is not spoiled by the acid smell occasionally met with in the native Rose-water. It is usual to calculate 100 bottles to one lac of Roses. The Rose-water should always be twice distilled ; over ten thousand Roses, water may be put to allow of sixteen or twenty bottles coming out ; the following day these twenty bottles are placed over eight thousand more Roses, and about eighteen bottles of Rose-water are distilled. This may be considered the best to be met with. The Attar is so much lighter than the Rose-water, that previous to use it is better to expose the Rose-water to the sun for a few days to allow of its being well mixed, and Rose-water that has been kept six months is always better than that which has recently been made.

At the commencement of the Rose season, people from all parts come to make their purchases, and very large quantities are prepared and sold. There are about thirty-six places in the city of Ghazeepore where Rose-water is distilled. These people generally put a large quantity of sandal oil into the receiver, the oil is afterwards carefully removed and sold as Sandal Attar, and the water put into carboys and disposed of as Rose-water. At the time of sale a few drops of sandal oil are placed on the neck of the carboy to give it a fresh scent, and to many of the natives it appears perfectly immaterial whether the scent arises solely from the sandal oil or from the Roses ; large quantities of sandal oil are every year brought up from the South and expended in this way.

The chief use the natives appear to make of the Rose-water

or the Sandal Attar, as they term it, is at the period of their festivals and weddings. It is then distributed largely to the guests as they arrive, and sprinkled in profusion in the apartments. A large quantity of Rose-water is sold at Benares, and many of the native Rajahs send over to Ghazeepore for its purchase. Most of the Rose-water, as soon as distilled is taken away, and after six months from the termination of the manufacture there are not more than four or five places where it is to be met with.

I should consider that the value of the Roses sold for the manufacture of Rose-water may be estimated at 15,000 rupees a year, and from this to 20,000, and from the usual price asked for the Rose-water and for which it is sold, I should consider there is a profit of 40,000 rupees. The natives are very fond of using the Rose-water as medicine or as a vehicle for other mixtures, and they consume a good deal of the petals for the conserve of Roses, or *Goolcund*, as they call it. There are several kinds of essential oils produced from the strong scented flowers in this district, which I will procure and send down to you.

ART. LV.—OBSERVATIONS UPON SYRUPS.

By M. Guibourt.

M. Emile Mouchon, a pharmacien at Lyons, having published, at the beginning of the year, a complete treatise upon *saccharoles* liquids, I was desired to present an account of the work in the *Journal de Chimie Medicale*, but other occupations have obliged me to postpone this labor; in the meantime most of the pharmaceutic repertories have announced and made known the treatise of M. Mouchon, so that a new announcement and analysis of it, would be at the present time superfluous. Nevertheless, many observations which have been suggested to me by this book, not having been made, and moreover, regarding it as an authority which is worth being balanced by others of the same order, I have taken advantage of this occasion to submit, for new discussion, all the formulæ of the syrups. It is the result of the examination made by me, that I shall present, in several articles, for the decision of pharmaceutists.

Simple syrup should naturally engage our attention in the first instance. It presents to me several questions to answer, either in relation to the proportion of the two components, water and sugar, or relatively to its areometric degree, to the mode of clarification, &c.

In the first edition of our Pharmacopœia, M. Henry, sen., and myself have admitted that boiling syrup, of 30° Baumé, (sp. weight 1262) should be, when cold, of 35°, or 1321, and that it was formed of two-thirds sugar and one-third water. Still later, however, Dr. Pector, a skilful mathematician, to whom I am indebted for judicious and exact notes upon the areometers which I have introduced into the second edition of the same work, has assured me that boiling syrup at 30° ought to weigh, when cold, but 34°, and that if it gave more by experiment, this was owing to the evaporation undergone during filtration and cooling; but

my experience not being in accordance with this calculation, I have admitted no change in our first exposition, and shall allow it to remain in the second edition of the Pharmacopœia. Still more recently M. Beral, in an interesting essay upon the syrup of cherries, has published the following table, upon the comparative composition and density of simple syrup.

Simple syrup.	*Boiling.*	*Cold.*
With 28 oz. of sugar,	30¼°	34¼
" 30 "	31	35
" 31 "	31¾	35¾.

Two inferences appear to be deduced from these results. First, that syrup, boiling at 30°, ought not to weigh, when cold, but 34; as was thought by M. Pector; next, that syrup when boiling at 30° contains less than 28 oz., of sugar, while it is admitted generally that it contains 32 ounces to 16 of water. It appears to me, however, that the definitive solution of these questions is not without interest to pharmaceutists.

In the first place, to determine the relation of the density of boiling syrups to cold, the following is the manner in which I have proceeded: Into a vessel full of boiling syrup, which was nearly done, I completely plunged a prover, so as to heat it to the same point as the liquid; I withdrew it from time to time in order to introduce the areometer, and at the same moment I observed the degree, by looking at it horizontally to the lowest part of the surface of the liquid, for the reasons set forth in the Pharmacopœia Raisonnée. When the syrup, thus inspected, and cooled as little as possible below 100°, just showed 30°, I closed the prover with a plate of glass, and the next day, having agitated the syrup in order to mix all the layers, and having exposed it in a cellar at a temperature of 15°, it weighed 35°. Thus nothing appears to me more certain than that boiling syrup at 30° weighs 35 at the temperature of 15° Centegrade.

In the second place, to determine the true composition in

water and sugar of boiled syrup, at 30°, or 35° cold, I took sugar of Santerie of the first quality, very white, very hard, sonorous, and of fine crystallization. I previously assured myself that this sugar, kept in a dry store-house, on the first floor, had lost nothing of its weight, by exposing it for two hours in a stove to a heat of 100°, so that it contained no water other than that of crystallization. I prepared three syrups by dissolving without heat in three close vessels, and in 16 ounces of water 28, 30, and 32 ounces of coarsely pulverized sugar. The 28 ounces of sugar were completely dissolved in a few days, but not the others. I then heated equally the three vessels until the solution was completely accomplished in all, and allowed them to cool.

To an eye which is accustomed to the way in which syrups are affected by the movement given to the vessels in shaking them, it is evident that the syrup prepared with 28 ounces is less consistent than that of common sugar ; and in addition, it acquires in a few days a disagreeable taste, and cannot be kept for any length of time ; it is not less certain that the one prepared with 32 ounces is too thick, and I doubt not that it would be susceptible of crystallizing at the end of a little time ; lastly, by agitation alone, it can be determined that the syrup prepared with 30 ounces is the best one.

At 17° C. I have determined the specific weight of the three syrups, and found them as follows:

	Density.	*Areometrical degree.*
Syrup of 28 oz.	1.311	34.20
30	1.320	35 hardly,
32	1.323	35.15.

The areometer which I used marked 34½, 35 and 35½, as I had before obtained with the same instrument 34½, 35 exactly, and 35½. Thus the syrup of 30 ounces still represents here that concentrated of 35 degrees when cold, corresponding in my first experiment to 30° boiling.

Apparently we should arrive at another result, if it were

desired to take the degree of the preceding syrups, by heating them in a water bath. Having heated them in this way and quickly weighed then in a prover, itself heated in boiling water, I have found

	Hot.	*Cold.*
For syrup of 28 oz.	31°	34½
30	31⅛	35
32	32½	35½.

But I satisfied myself that the syrup heated in a flask by means of a salt water bath, was not elevated beyond 90°, and that after its transfer to the prover it was not above 85°. It is at this temperature that the results above stated have been determined, which explains the less marked difference presented in the cooled syrup.

At another time, I heated three similar flasks in a boiling bath of hydrochlorate of lime, the syrups were elevated to 105°, and underwent commencing ebullition. Poured into a prover and weighed as rapidly as possible, that of 28 ounces marked 31 degrees, and that of 32 ounces 32¼°; the other had been lost. These experiments, not very exact, cannot counterbalance the first, where the syrup, taken in quantity when boiling, is weighed immediately and guarded from evaporation until it has completely cooled. To resume. I regard it as certain that simple syrup of 30° when boiling, weighs 35° when cold, and that this syrup, which I call *normal*, contains only 30 ounces of crystallized sugar to 16 ounces of water.

Clarification by Albumen.

A great number of writers upon pharmacy, recommend us to melt the sugar over a fire in the largest proportion of the water to which albumen has been added. But even the precaution indicated of not bringing the liquid to the boiling point until the sugar is completely melted, evinces one of the vices of this method, which consists in this that the sugar not being ever completely dissolved before the coagulation of the

albumen, it carries with it a considerable proportion into the scum formed. I may say further, that pharmaceutists who have recommended this proceeding, have had no idea of the important part which the air performs in albuminous clarification. The albumen in coagulating, forms truly, as it is said, a tissue which catches and collects heterogeneous particles suspended in the liquid. But it is in the first instance the air introduced into the albumen, by beating it, which by expanding with heat, renders the scum lighter than the liquid, and forces it to rise to the surface; without it the albumen would remain suspended in the syrup, or when cold be precipitated, as in the clarification of wine, by albumen beaten in the same way, but not heated. When, therefore, sugar and water containing albumen are placed together over a fire, a portion of the interposed air is disengaged before ebullition, and becomes useless, while on the other hand, by reserving as I have recommended to be done, all the albumen to pour it in parts, and *from a height* into the syrup when boiling, the quantity of interposed air is augmented, and also the power communicated to the albumen of bringing the impurities of the syrup to the surface. By operating thus, the maximum effect of clarification is obtained with a given quantity of albumen, and more product.

Finally, in observing what occurs, when at the termination of clarification, there is added pure aerated water to bring to the surface the remainder of the albumen and substances which float in the syrup, the idea has struck me that aerated water might alone be sufficient for the clarification of sugar; and in fact, having dissolved a loaf of common sugar, of the weight of 6 k. 260, in 3 kil. of water, having carried it to ebullition, having skimmed it, and having poured in, at ten different times, by portions, the quarter of a litre, 2 k. 500 of filtered water, I effected the complete clarification of the syrup, with the removal of a quantity of scum which did not weigh more than 4 oz. I do not recommend, however, the employment of this method, on account of the time which it takes, and because, in truth, the scum is more easily removed when

it is united with coagulated albumen, which collects from the interposed air ; but I give it as a proof of the action exerted by the air in clarifying a given quantity of albumen, and of the superiority of the method which adds to a given quantity of albumen, the greatest possible quantity of atmospheric air.

Journ. de Chimie Medicale.

MISCELLANY.

On the best means of burning gas for heat. By Sir John Robison, K. H., Sec. R. S. E., M. S. A.*

"Vix ea nostra voco."

When carburetted hydrogen gas is employed in producing heat, it i seldom required that it should at the same time give out light; the combustion may, therefore, be managed in any mode which may be convenient without seeking to preserve the illuminating power. It appears to have occurred about the same period to Dr. Duncan and to myself, that, by passing a current of gas, mixed with atmospheric air, through a wide vertical tube, having its upper end covered by a diaphragm of wire gause, and by kindling the mixture as it escaped through the interstices of the wire cloth, a convenient stove might be formed for culinary purposes. Dr. Duncan applied some small apparatus on this principle to pharmaceutical operations in his class room, and I had my kitchen furnished with a range of large stoves, which were intended to supersede the use of French charcoal stoves in various culinary processes. In both cases the success has been perfect, and the same principle has been adopted with advantage in a variety of processes in the useful arts, where this neat and cleanly method of applying heat has rendered it a valuable acquisition to the work shop. The form of the apparatus may be varied in any way to suit the particular process to which it is applied; as all that is essential is, that a current of the mixed gas and air shall rise through wire cloth, and that the proportion of gas to atmospheric air shall never be so great as to allow the flame to become yellow, as, with this precaution, the combustion of the carburetted hydrogen will be complete, and no deposit of soot will take place on cold bodies when set over the flames; the proper quantity of gas in the mixture is easily determined by the stop cock belonging to each stove.

For ordinary purposes, the cylinders may be thirty inches long and three or four inches in diameter, and the wire cloth for the stove should have thirty wires to the inch. That which is manufactured for safety lamps answers well for this purpose.

Whenever from accidental injury or decay, a hole takes place in a

* Read before the Society of Arts for Scotland. The special thanks of the Society were awarded to the author.

diaphragm, it is no longer possible to use it; as when lighted, the flame passes through the fracture, and communicates with the flame at the bottom of the cylinder, which then burns like an ordinary gas light, and like it, would blacken the surface of any cold body presented to it. The wire cloths, if not broken through by violence, will last for months although in daily use; and if covered by a layer of coarse sand or pounded lime stone, will continue serviceable for an unlimited period.

When more intense heat is required than is attainable by the unaided combustion of the mixed gases, recourse may be had to various forms of blow pipes; and when a large volume of such flame is to be employed, the current of atmospheric air may be urged by double bellows. A very efficient apparatus on this principle is to be seen in the laboratory of Dr. B. Reid.

It is to be regretted, that such applications of gas are not more generally known and introduced into work shops, as there are numerous processes in the arts in which they would afford facilities to the workman which he can scarcely command by any other means. For example, in the hardening of steel tools, it is well known that a piece of bright steel, when heated to redness in a forge or muffle, is subject to oxidation and that a black scale remains after hardening, which it is difficult to remove without some injury to the work, as in the case of a screw tap; whereas, if the same piece of steel be heated in a flame of the mixed gases, where there is no free oxygen to attack its surface, it may be *made and kept* red hot without injury to its finest edge; it will be discolored, but without losing much of its polish. The artist has also the advantage of a distinct view of the article while it is being heated, and the power of withdrawing it from the flame the moment it has acquired the proper color, which, in the hardening of cast steel cutting tools, is of great importance.

Many attempts have been made to apply carburetted hydrogen and pure hydrogen gases to the purposes of warming buildings, and various forms of stoves have been proposed, on the understanding, it would appear, that, by applying the flame of the gas to the metallic bodies an increased degree of heat would be communicated by them to the atmosphere around. A little consideration will show, that however the *distribution* may be modified by such contrivances there can be no increase of the heating power; and that when a certain measure of gas is fairly burned, the heat evolved into the apartment will be the same whether the flame be disposed as a light, or made to play against metallic plates or other combinations of apparatus. In all cases where the products of combustion are allowed to mix with the atmosphere of the apartment, without provision being made for carrying them off by ventilation, the effects of such processes must be more or less deleterious to health, according to the proportion these products bear to the mass of air they mix in. On the whole, it may be assumed, that this mode of heating apartments is the most expensive,

the least efficient, and, excepting that by Joyce's charcoal stove, the most insalubrious that can be resorted to.

Edin. New Phil. Journ.

Analysis of the ashes of the Salsola tragus. By M. Guibourt.—M. Rayer having lately obtained a pretty considerable quantity of the *salsola tragus*, to experiment with, in calculous affections, M. Guibourt burnt a certain quantity of it, and subjected to analysis the fixed products of this incinneration. He found them formed of

Carbonate of potassa,	29.04
Chloride of potassium,	17.89
Sulphate of potassa,	4.93
Carbonate of lime,	40.26
Phosphate of lime and oxide of iron,	7.88
	100.00

These results are very remarkable, since they determine the existence of potassa, to the exclusion of soda, in a plant growing upon the borders of the sea, and appertaining to a botanical genus especially characterized by the production of soda.—*Journ. de Pharm.*

Note apon Quinine. By M. H. Magonty.—An accidental circumstance has led M. Magonty to study the influence of ammonical salts upon Quinine treated at different degrees of temperature; thinking, like him, that all that relates to the alkaloid of Cinchona should be interesting, we report the conclusion to which his observations have led him.

1. Quinine is more soluble in water than is generally thought, and the solution is greater by heat than cold.

2. Quinine is dehydrated in the midst of water carried to 60°.

3. Quinine is easily crystallized by means of water, when by the aid of alcohol this result is very different.

4. Ammonia decomposes, when cold, the salts of Quinia but partially, the same is the case with magnesian salts, and in turn the ammonical salts are decomposed by Quinine by aid of ebullition in water.

Journ. de Ch. Med.